ASPECTS OF THE ORNITHOLOGY OF THE TRISTAN DA CUNHA GROUP AND GOUGH ISLAND, 1972 - 1974

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ABSTRACT

This paper details observations made between 1972 and 1974 at the Tristan da Cunha group and Gough Island, South Atlantic Ocean and draws together the existing published data from the region up until 1976.

A revised checklist comprises 70 taxa. There are 21 breeding species of seabirds. There are six or seven extant species of landbirds, constituting 11 endemic taxa. Totals of 38 confirmed and 13 unconfirmed species of vagrants have been recorded.

In 1973 a population of flightless moorhens *Gallinula* sp. was discovered on Tristan and the status of the flightless Tristan Moorhen *G. nesiotis*, formerly regarded as extinct, is now uncertain.

The islands support the largest populations in the world of Yellownosed Albatrosses *Diomedea chlororhynchos*, Sooty Albatrosses *Phoebetria fusca* and Great Shearwaters *Puffinus gravis*. They are the only station for the spectacled subspecies of the Whitechinned Petrel *Procellaria aequinoctialis conspicillata* and the Atlantic Petrel *Pterodroma incerta*. Approximately 30 million pairs of seabirds breed annually. There are millions of pairs of Rockhopper Penguins *Eudyptes chrysocome*, Softplumaged and Kerguelen Petrels *Pterodroma mollis* and *P. brevirostris*, Great Shearwaters and Broadbilled Prions *Pachyptila vittata vittata*. The breeding density varies between three pairs of landbirds and 500 pairs of seabirds km^{-2} on Tristan to 300 pairs of landbirds and one million pairs of seabirds km^{-2} on Nightingale. Tristan has only 40 000 pairs of 11 species of seabirds whereas Gough supports around 20 million pairs of 22 or 23 seabird species.

The small populations of the spectacled Whitechinned Petrel and the endemic landbirds make them endangered forms. The Tristan Thrush *Nesocichla eremita* is threatened by feral cats *Felis catus* and Black Rats *Rattus rattus* on Tristan. There is potential danger from artificial inter-island transfer of the subspecies of thrushes. There is evidence of persistent organochlorine pesticide residues in the eggs of the Tristan Thrush on Nightingale. The few Wilkins' Buntings *Nesospiza wilkinsi* have a precarious existence because of their dependence on *Phylica*.

The environment of Nightingale has been threatened for the last 50 years by the alien, aggressive New Zealand Flax *Phormium tenax*. In 1976 it was reported as having been completely removed; a few plants still survived on Inaccessible at the time of writing. Rats remain the biggest single threat, accounting for the paucity of smaller seabirds on the main island. Dead rats have been imported to Nightingale and Gough. Oil pollution may constitute a new threat to the seabird populations.

Details of the population, breeding cycles, diet, taxonomy and morphology of the breeding species are presented. The Sooty Albatross has an incubation period of *c.* 73 days, a chick-rearing period of *c.* 152 days and a breeding season lasting 9 - 10 months. It is sexually dimorphic. The courtship is similar to that of the Yellownosed Albatross but includes an aerial performance. Pre-breeding albatrosses may be identified by their stilted, unrefined courtship behaviour.

The Atlantic and Greatwinged Petrels *Pterodroma incerta* and *P. macoptera* are sympatric sibling species. The Atlantic Petrel differs from the Greatwinged Petrel in size, colour and polymorphism. It lays one month later and disperses south in the summer.

There is a distinct sexual dimorphism in the adult and immature plumages of the Inaccessible Flightless Rail *Atlantisia rogersi*.

There has been an increase this century in the number of vagrant herons and American Purple Gallinules *Porphyrula martinica*. They arrive in autumn in an emaciated condition and may stay for up to six months. Waders (Charadrii) arrive in the autumn and spring. Favouring the hypothesis of a Neotropical origin for the endemic landbirds are the prevailing wind direction, the similarities between the Tristan land forms and extant South American ones, the wholly American affinities of the vagrants and at the correspondence between those arriving at Tristan and at the Falkland Islands.

The 300 islanders remain heavily dependent on their seabird harvest, which is increasing at the time of writing despite their relative affluence and cash economy. In 1974, the harvest comprised *c.* 45 000 chicks and 3 000 adult Great Shearwaters, 800 litres of fat, 24 tonnes of guano, 40 000 Rockhopper Penguin eggs and 400 eggs and 2 000 chicks of the Yellownosed and Sooty Albatrosses. In the past, hunting has reduced the populations of penguins, albatrosses and gadfly petrels *Pterodroma* spp. on the main island, all of which are now recovering. The Yellownosed Albatross has been over-exploited on Nightingale. The importance of documenting the harvest and monitoring populations was not recognized by the islanders or by the Administration during 1972-1974.

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INTRODUCTION

Between 21 October 1972 and 4 November 1974 I was the medical officer at Tristan da Cunha. Approximately 2 800 km from the nearest mainland and on the edge of the 'Roaring Forties', Tristan is the most isolated island inhabited by man. Ships called infrequently and there was no airstrip during my sojourn.

This paper, which relates my observations on the birds of the Tristan da Cunha group and Gough Island over a two-year period, compliments the studies of Hagen (1952), Elliott (1957) and Swales (1965). Two other valuable reference papers are those of Rowan (1951, 1952). The monograph of Wace & Holdgate (1976) provides a most useful review of the history, geography and vegetation of the islands.

METHODS

During my stay at Tristan da Cunha I made 70 ascents onto the mountain plateau (the 'Base') of the main island, mostly to the south side. Some 20 days were spent observing birds offshore around the main island from ships and fishing dinghies.

Nightingale was visited on 2-8 February 1973, 25 November 1973, 10-12 September 1974 and 15 October 1974. Middle Island was visited on 11 September 1974. Stoltenhoff Island was approached on 11 September 1974 and I went ashore on 15 October 1974. I stayed on Salt Beach, Inaccessible Island, between 15-19 January 1974 but did not visit the plateau. I spent between 21-28 October 1972 offshore at Gough Island. I returned there on 29 October 1974, landed the following day at Archway and remained until 4 November 1974, on which day I also landed at Long Beach.

Populations were determined by one or a variety of the following methods: a ground count of nesting pairs; calculating the breeding density at sample sites and then extrapolating to the whole area; using published estimates; and visual impressions of birds in offshore rafts and flocks or flying overhead as they came into land in the evening.

Counting birds in large colonies on remote islands is difficult. The vast numbers themselves make accurate counts well nigh impossible. My provisional figures are based on relatively few observations. The reliability of census methods varied from accurate ground counts of individual breeding birds at the nest, to visual impressions of birds wheeling overhead and to guesses. Nor was there always consistency in the methods I used at different stations even when dealing with the same species. To compensate for this I have tried to use the widest latitudes. I think that when more accurate appraisals become available I will have been found to have erred cautiously.

Ground counts were made of nearly all breeding pairs of Rockhopper Penguins *Eudyptes chrysocome*, Subantarctic Skuas *Catharacta antarctica* and Tristan Thrushes *Nesocichla eremita* on Tristan and of Yellownosed Albatrosses *Diomedea chlororhynchos*, Sooty Albatrosses *Phoebetria fusca*, Antarctic Terns *Sterna vittata* and Brown Noddies *Anous stolidus* on Tristan, Nightingale, Middle Island and Stoltenhoff. Extrapolating from the breeding density at sample sites to estimate the total population was employed with Rockhopper Penguins and Great Shearwaters *Puffinus gravis* at Nightingale and its outliers. This method was also used at Tristan and Gough for the moorhens *Gallinula* spp. and for buntings.

Except for using Rowan's (1952) figures for the breeding density of Great Shearwaters on Nightingale, all other population estimates at Tristan, Nightingale, Middle Island and Stoltenhoff are my own. I used the published estimates of others if I was unable to assess the populations myself and this was the case with many of the birds at Inaccessible and Gough. Those figures taken from the literature are, however, ones that complemented my own overall impressions. Population estimates for Rockhopper Penguins, Wandering Albatrosses *Diomedea exulans*, Yellownosed and Sooty Albatrosses, spectacled Whitechinned Petrels *Procellaria aequinoctalis conspicillata*, Great Shearwaters, Inaccessible Flightless Rails *Atlantisia rogersi* and Wilkins' Buntings *Nesospiza wilkinsi* are from Elliott (1957) and population estimates of the Tristan Thrush and the Tristan Bunting *N. acunhae* are from Hagen (1952). At Gough I used Verrill's (1895) and Wace & Holdgate's (1976) estimates for Wandering Albatrosses, Elliott's (1970a) estimates for Great Shearwaters and Swales' (1965) estimates for Rockhopper Penguins, giant petrels *Macronectes* sp. and Subantarctic Skuas.

Swales' (1965) and Elliott's (1970a) impressions of the relative abundance of burrowing petrels at Gough were most helpful, more especially since the time of their visits was different from my own. I used their impressions alone in order to estimate population sizes of Grey Petrels *Procellaria cinerea* and Whitebellied Stormpetrels *Fregetta grallaria*.

Estimates based on visual impressions of inshore rafts and flocks and guesses of the absolute numbers and relative abundance of birds coming to land in the evening were used in the case of petrels, prions and stormpetrels at all the islands. In the Tristan da Cunha group, I made frequent counts and was able to supplement these by counts of birds on land and their nests. At Inaccessible and Gough Islands, visual impressions alone were used.

Where the status of a bird was unknown, I avoided guessing. Populations not assessed were mainly from Middle, Stoltenhoff and Inaccessible Islands. None is likely to exceed a few hundred pairs.

The most reliable population estimates were obtained at Tristan and Nightingale and its offshore islets, since I was most familiar with these islands. The populations of penguins, albatrosses, skuas, terns and landbirds were relatively easy to assess since they are diurnal, surface nesters. Estimates of these species are thus probably more reliable than are those of the other breeding species.

The least reliable figures are those of the burrowing petrels and prions of Inaccessible and Gough islands where I spent only a total of 19 days, and was confined to very limited sections of both islands in the summer. The estimates of stormpetrels are included primarily for the sake of completeness and cannot be considered to be at all accurate.

To offset some of the inevitable inaccuracies, I ranked the petrels at Inaccessible and Gough Islands into population categories of orders of magnitude. Experience of the paucity of birds on Tristan and their abundance on Nightingale allowed the numbers of birds of Inaccessible and Gough to be put into perspective. Populations are expressed in terms of breeding pairs throughout unless stated otherwise.

A total of 256 skins was collected from among all the known breeding species and from many of the vagrants. These were deposited, together with some skeletons and eggs, at the Royal Scottish Museum, Edinburgh and the British Museum (Natural History), London.

I studied aspects of the breeding biology and diet and made observations on behaviour of several species.

I obtained data on the bird harvests of the Tristan islanders in relation to the conservation of the species concerned.

I recorded vagrants (both sea - and land birds), and made observations on mammals, which are included as an appendix.

RESULTS AND DISCUSSION

1. A DESCRIPTION OF THE ISLANDS

Tristan da Cunna

Tristan da Cunha is tne largest (86 km^2) and highest (2 066 m) of the islands and the only one supporting an indigenous human population. There were 299 islanders and several expatriate families in October 1974. The islanders retain their traditional farming methods as well as their boating and mountaineering skills.

Topography and vegetation

The island's steep seaward cliffs rise to 600 m and give way to three low lying areas at Edinburgh Settlement, Sandy Point and Stony Beach. The Settlement Plain is 1 km at its widest and 8 km long. It is heavily overgrazed by sheep and cattle and the original cover of *Spartina arundinacea* tussock grass and *Phylica arborea*, the "Island Tree", has been replaced by imported grasses. This is also the position at Stony Beach, which is badly eroded by feral cattle, and at Sandy Point where there is also an orchard and a conifer plantation. Below 700-800 m the vegetation is dominated by the Dwarf Tree Fern *Blechnum palmiforme* and by *P. arborea*. Above this level and up to 900 m the ground is generally boggy and the vegetation comprises *B. penna-marina* and the aliens *Rumex acetosella* and *Holcus lanatus*. Above this there is a wet heath of *Epetrum* sp. sedge and grasses. Cinder screes predominate above 1 500 m and support little vegetation. Encircling the island is a sublittoral zone of kelp *Macrocystis* sp.

Permanent running water is found only on the Settlement Plain although small water bodies, including tnree crater lakes, exist on the Base plateau.

Climate

Tristan lies close to the mean position of the Subtropical Convergence and the climate is cool temperate. The average annual rainfall for 1943-1947 was 1 840 mm (Secretary for Transport, Pretoria pers. comm.). Snow may lie on the Peak throughout the winter, occasionally descending to 600 m. The average sea surface temperature ranges from 12,7 to 17,5 °C (Hydrographic Office, British Admiralty pers. comm.). The prevailing winds are northwesterly to southwesterly, occasionally from the north and south and only rarely from the east. Wind direction can veer suddenly, however, and squalls of over 100 knots are not uncommon. The peak is almost always encircled by orographic cloud.

Ornithology

The main island now supports only 11 known species of breeding

seabirds and two species of breeding landbirds (Table 1). Before man arrived, it may have supported 19 seabird species and four landbird species, the former group in many millions.

The Wandering Albatross became extinct between 1880-1907 due to excessive culling (Wace & Holdgate 1976); giant petrels, probably the Southern species *Macronectes giganteus*, became extinct around 1870 due to a decrease in their food supply (Elliott 1957) and disturbance (Wace & Holdgate 1976); Great Shearwaters became extinct after a few seasons in the 1940's: they may well have also been on the island before the destruction of the tussock grasslands. It is possible that before the arrival of Black Rats *Rattus rattus* in 1882, Kerguelen Petrels *Pterodroma brevirostris* and Little Shearwaters *Puffinus assimilis* bred in small numbers. Whitefaced Stormpetrels *Pelagodroma marina*, Whitebellied Stormpetrels *Fregetta grallaria* and Common Divingpetrel *Pelecanoides urinatrix* may have been abundant. The Subantarctic Skua may soon be added to the list of extinct breeding seabirds on the main island.

The Tristan Bunting became extinct on the main island between 1852 and 1873 (Wace & Holdgate 1976), probably due to the destruction of the lowlying tussock. Only one specimen from Tristan da Cunha exists, in the Berlin Museum. It seems not unreasonable to speculate that it was racially distinct from the forms currently on Inaccessible and Nightingale. The Tristan Moorhen *Gallinula nesiotis* was thought to have become extinct between 1873-1906 (Beintema 1972a). The criteria previously used to separate the Tristan and Gough Moorhens *G. comeri* may well prove to be invalid. Ultimately the status of presumed extinct forms may rest on the analysis of bone remains.

Tristan supports an estimated 40 000 breeding pairs of seabirds, mostly confined to the southwestern quadrant which has suffered least from human disturbance (Table 2). The estimated breeding density is only 500 pairs km^2. If, like Gough, only half of its area was suitable for dense breeding populations, then Tristan might have supported 15 million pairs of seabird in the past. This assumes that the seabirds died out on Tristan rather than emigrated and that Tristan could have supported the same densities of seabirds that currently exist on the other islands (*c.* 400 000 pairs km^2). Whereas the figure of 15 million is purely speculative, it gives some idea of the destructive potential of man and his commensals on the avifauna of remote islands. The impoverished status of landbirds on Tristan mirrors that of the seabirds.

Nightingale Island

Nightingale is regularly visited by the islanders for harvesting seabirds, eggs and guano and a number of wooden huts and pathways have been constructed for this purpose. Sheep were formerly grazed on the island but no agricultural use is currently made of it.

Topography and vegetation

The oldest island in the group, Nightingale lies 38 km southwest

TABLE 1

A REVISED CHECK LIST OF THE BIRDS OF THE TRISTAN DA CUNHA GROUP AND GOUGH ISLAND UP TO 1974

Species	Island					
	Tristan	Nightingale	Middle	Stoltenhoff	Inaccessible	Gough
King Penguin *Aptenodytes patagonicus*						v
Rockhopper Penguin *Eudyptes chrysocome*	b	b	b	R	b	b
Macaroni Penguin *E. chrysolophus*	v	v	v		v	
Wandering Albatross *Diomedea exulans exulans*					v	v
Tristan Wandering Albatross *D. e. dabbenena*	E				b	b
Shy Albatross *D. cauta*	v					
Blackbrowed Albatross *D. melanophris*	R	R			R	R
Greyheaded Albatross *D. chrysostoma*	r					r
Yellownosed Albatross *D. chlororhynchos*	b	b	b	b	b	b
Sooty Albatross *Phoebetria fusca*	b	b		b	b	b
Lightmantled Sooty Albatross *P. palpebrata*	r					r
Southern Giant Petrel *Macronectes giganteus*	RE	R			R	b
Northern Giant Petrel *M. halli*	R	R			R	R
Antarctic Fulmar *Fulmarus glacialoidea*	R	R			R	R
Pintado Petrel *Daption capense*	R	R				R
Greatwinged Petrel *Pterodroma macroptera*	b				b?	b
Atlantic Petrel *P. incerta*	b				b?	b
Kerguelen Petrel *P. brevirostris*	b?	b?	b?	b?	b	b
Softplumaged Petrel *P. mollis*	b	b	b?	b?	b	b
Whitenecked Petrel *P. externa*	v					
Broadbilled Prion *Pachyptila vittata*	b	b	b?	b?	b	b
Whitechinned Petrel *Procellaria aequinoctialis*	R	R				R
Spectacled Whitechinned Petrel *P.a. conpicillata*	R	R			b	

Grey Petrel *P. cinerea*	b				b?	b
Cory's Shearwater *Calonectris diomedea*						v
Little Shearwater *Puffinus assimilis*	b?	b	b?	b?	b	b
Great Shearwater *P. gravis*	E	b	b	b	b	b
Sooty Shearwater *P. griseus*	v					v
Wilson's Stormpetrel *Oceanites oceanicus*	R					R
Greybacked Stormpetrel *Garrodia nereis*						b
Whitefaced Stormpetrel *Pelagodroma marina*	R.	b	b?	b?	b	b
Whitebellied Stormpetrel *Fregetta grallaria*		b	b	b?	b?	b
Common Divingpetrel *Pelecanoides urinatrix*		b	b?	b?	b	b
Whitenecked Heron *Ardea cocoi*						v
Great White Egret *Egretta alba*	V	v				v
Snowy Egret *E. thula*	V					v
Striated Heron *Butorides striatus*	v					
Cattle Egret *Bubulcus ibis*	V					V
Chilean Teal *Anas flavirostris*	v					v
Inaccessible Flightless Rail *Atlantisia rogersi*						B
Paintbilled Crake *Neocrex erythrops*	v					
Tristan Moorhen *Gallinula nesiotis*	E?B?					
Gough Moorhen *G. comeri*	B?					B
Common Moorhen *G. chloropus*	v?					
Redgartered Coot *Fulica armillata*	v					
American Purple Gallinule *Porphyrula martinica*	V	v			v	
South American Dotterel *Zonibyx modestus*	v					
Solitary Sandpiper *Tringa solitaria*	v					
Spotted Sandpiper *Actitis macularia*	v					
Sanderling *Calidris alba*	v					
Sharptailed Sandpiper *C. acuminata*	v					
Pectoral Sandpiper *C. melanotos*	v					
Whiterumped Sandpiper *C. fuscicollis*	V					
Upland Sandpiper						

Bartramia longicauda	v					
Turnstone						
Arenaria interpres	v	v				
Subantarctic Skua						
Catharacta antarctica	B	B	B	B	B	B
Kelp Gull						
Larus dominicanus	V	V			V	V
Franklin's Gull						
L. pipixcan	v					
Antarctic Tern						
Sterna vittata	B	B		B	B	B
Arctic Tern						
S. paradisaea	v					
Common Noddy						
Anous stolidus	b	b		b	b	b
European Swallow						
Hirundo rustica	V					
Tristan Thrush						
Nesocichla e. eremita	B					
N.e. gordoni					B	
N.e. procax		B	B	B		
Tristan Bunting						
Nesospiza a. acunhae	E				B	
N.a. questi		B	B	B		
Wilkins' Bunting						
Nesospiza w. wilkinsi		B				
N.w. dunnei					B	
Gough Bunting						
Rowettia goughensis						B

STATUS

v = rare vagrant (< 5 records or sightings)
V = regular vagrant (> 5 records)
b = nonresident breeder
B = resident breeder
R = regular nonbreeding visitor
r = occasional nonbreeding visitor
E = formerly bred, now extinct

TABLE 2

ESTIMATES OF SEABIRD POPULATIONS IN EACH QUADRANT OF TRISTAN DA CUNHA, 1972–74

Species	Northwest*	Northeast	Southwest	Southeast
Rockhopper Penguin	0	1 100	0	5 900
Yellownosed Albatross	200–400	2 800–4 600	3 000–5 000	10 000–20 000
Sooty Albatross	50–100	50– 200	500– 700	1 400– 2 000

* contains Edinburgh Settlement

of Tristan. Its highest point is *c.* 700 m and it is *c.* 4 km² in area. There are no streams, open areas of fresh water or gulches as on the main island. In the centre are four marshy areas known as "The Ponds" and notable for their concentration of nesting Yellownosed Albatrosses.

The vegetation consists predominantly of dense, 2-3 m high Spartina tussock and there are some 20 ha of *Phylica* New Zealand Flax *Phormium tenax* was introduced around 1920 for rope making but, since it suppresses the native *Spartina*, persistent efforts were made to eliminate it. The last four remaining plants were removed in November 1976 (N.M. Wace pers. comm.).

Climate

Nightingale is warmer and dryer than Tristan and is usually cloud-free.

Ornithology

Thirteen species of seabirds and three species of landbirds breed on the island (Table 1). The habitat diversity is relatively low but the continuous tussock grasslands support very large numbers of Great Shearwaters with the result that the breeding bird density is the highest of the islands at an estimated one million pairs km . At an estimated 300 pairs km² the density of breeding landbirds is also the highest of all the islands.

Middle Island

Rockhopper Penguin eggs, guano and albatross eggs and chicks are collected regularly by the Tristan islanders but no living quarters exist.

Topography and vegetation

Middle Island, known also as Alex Island, lies about 100 m from Nightingale. It rises to about 40 m and is *c.* 0,5 km² in area. (Elliott (1957) estimated 115 acres). It is covered in *Spartina* tussock grass and has a few boggy areas. Two thirds of its area is occupied by a penguin colony, and the rest is largely burrowed by Great Shearwaters.

Ornithology

Four species of seabirds are known to breed, a furtner eight may do so (Table 1). The numerous Great Shearwater burrows are short because of the shallow soil. Two species of landbird occur, the Tristan Thrush and the Tristan Bunting.

Stoltenhoff Island

Stoltenhoff Island is only rarely visited although albatross chicks have been collected in the past. Apparently no previous

ornithological visit has been made.

Topography and vegetation

Stoltenhoff, or Stoffenberg, is *c.* 1,5 km north of Nightingale. Access is difficult and landing feasible only under calm conditions and at the most northerly and northwesterly points. It is *c.* 0,2 km² in area (Elliott (1957) estimated 55 acres) and rises gradually to a height of about 60 m at its southerly point. Here it is separated from a high narrow pinnacle and a large stack. On its westerly and windward side, low cliffs give way to bare rock where brackish water collects and Yellownosed Albatrosses breed. The rest of the island is covered with short Spartina tussock less than 1 m high from which many rocky outcrops protrude. Only one stunted *Phylica* tree was noted. The tussock increases in height towards the high easterly cliffs.

Ornithology

The island is used as a moulting station by Rockhopper Penguins but the species does not breed there. Six seabird species and two species of landbirds are known to nest (Table 1), both at a lower density than at Nightingale Island.

Inaccessible Island

Inaccessible Island was formerly used for cultivation with sheep, cattle and pigs being grazed. All stock died off before 1974. Landings on the narrow boulder beach at Waterfall or the more exposed one at Blenden Hall are difficult and the island is now visited infrequently.

Topography and vegetation

The island lies 40 km southwest of Tristan and 22 km northwest of Nightingale. It is surrounded by *Spartina* tussock-clad cliffs up to 350 m. Its centre is an undulating plateau of *Blechnum* spp, *Empetrum* sp., *Phylica arborea* and grasses. New Zealand Flax has been introduced and a few plants remained at Waterfall in 1974. It is about 12 km² in area and rises to about 700 m.

Freshwater is plentiful both in streams and pools.

Climate

Unrecorded at the time of writing. Not infrequently an orographic cloud nangs over the island.

Ornithology

The ornithology of Inaccessible Island is relatively poorly documented, particularly during winter months. It supports between 15 and 19 species of seabird and four species of

landbirds (Table 1), the former at an apparently low relative density of 50 000 pairs km². Its great importance lies in its endemic populations of the spectacled Whitechinned Petrel and the Inaccessible Flightless Rail.

Gough Island

A permanently manned South African Meteorological station is sited in the southern corner of the island at Transvaal Bay. Sheep, goats and poultry were formerly imported for the weather teams but none now remain.

Topography and vegetation

Gough Island lies 370 km southeast of Tristan, on the edge of the 'Roaring Forties'. The central plateau rises to 600 m and is bounded on the west by cliffs up to 450 m. The east and north sides are scarred by deep valleys. The coastal cliffs are mantled with tussock grass, below 300 m the vegetation is dominated by *Blechnum* spp and *Phylica arborea*. Above this is a wet heatn of sedges, mosses and grasses which gives way to a feldmark montane vegetation with sparse cover above 600 m. The upland valley bogs are covered in *Sphagnum* spp. (Wace & Holdgate 1976). Gough is 57 km² in area. Its highest point (Edinburgh Peak) is at 910 m.

Climate

Gough Island is colder, wetter and windier than the islands of the Tristan group. The average annual rainfall for 1956-1970 was 3 210 mm (Secretary for Transport, Pretoria pers. comm.). Cloud cover is frequent and there are few fine days.

Ornithology

Gough Island, probably because of its size, varied geography, and absence of rats, supports the greatest number and variety of seabirds in the region: probably 21 species in all (Table 1). Five species most likely number millions each and another five species occur in hundreds of thousands. It is possible that it is the most important single breeding station in the world for Rockhopper Penguins *E.c. moseleyi*, Wandering Albatrosses *D. e. dabbenena*, Sooty Albatrosses, Atlantic Petrels, Kerguelen Petrels, Little Shearwaters and Broadbilled Prions. Its two landbirds exist at only a fraction of the population density of those on the northerly islands.

2. CHECKLIST

Composition

I list 70 confirmed taxa compared to the 40 of Hagen (1952) and the 60 of Elliott (1957). Of the 70 forms, 39 are seabirds, of which 31 belong to the order Procellariiformes. Nine are waders

(Charadrii) and 22 are landbirds (Table 1). There are 21 breeding seabird species. There are six or seven extant breeding landbird species made up of a number of subspecies. The status of the Tristan Moorhen, formerly thought to be extinct, is now uncertain, but it is included in the checklist. There are 38 confirmed vagrant species comprising 18 seabirds, nine waders and 11 landbirds. Table 1 lists the breeding species for all the islands covered.

Additions and revisions

Elliott's (1957) list has been revised and 20 confirmed new species added. These are: King Penguin *Aptenodytes patagonicus*, Shy Albatross *Diomedea cauta*, Greyheaded Albatross *D. chrysostoma*, Lightmantled Sooty Albatross *Phoebetria palpebrata*, Cory's Shearwater *Calonectris diomedea*, Sooty Shearwater *Puffinus griseus*, Whitenecked Heron *Ardea cocoi*, Great White Egret *Egretta alba*, Striated Heron *Butorides striatus*, Cattle Egret *Bubulcus ibis*, Chilean Teal *Anas flavirostris*, Paintbilled Crake *Neocrex erythrops*, Common Moorhen *Gallinula chloropus*, Redgartered Coot *Fulica armillata*, Solitary Sandpiper *Tringa solitaria*, Sanderling *Calidris alba*, Pectoral Sandpiper *C. melanotos* Turnstone *Arenaria interpres* and Franklin's Gull *Larus pipixcan*. The separation of the genus *Macronectes* into two species, (Bourne & Warham 1966) has led to the addition of the Northern Giant Petrel *M. halli*.

Deletions

I have omitted three forms which appear in previous lists. These are the Whiteheaded Petrel *Pterodroma lessonii*, Dove Prion *Pachyptila vittata desolata* and Common Divingpetrel *Pelecanoides urinatrix elizabethae*.

Verrill (1895) gave an account of Captain Comer's visits to Gough between 1887-1889 and stated that Comer saw, but did not collect, Whiteheaded Petrels and Dove Prions. Comer did collect these species at Kerguelen Island. However, since he did not allude to either the abundant Atlantic Petrel or the Broadbilled Prion at Gough Island it is most likely that he mistook these for Whiteheaded Petrels and Dove Prions respectively.

Like Elliott (1957) I anticipate that the Whiteheaded Petrel will in due course be recorded in Tristan waters. He noted it 500 nautical miles northeast of Tristan and I saw it 500 nautical miles east of Gough Island.

Pelecanoides u. elizabethae, the race of the Common Divingpetrel thought to be peculiar to Gough, has not been substantiated by further specimens (Bourne 1968).

3. BREEDING SPECIES

Rockhopper Penguin *Eudyptes chrysocome*

Local name: Pinnamin

Population size

Seven colonies exist in the northeast and southeast quadrants of Tristan, contrary to previous reports (Flint 1967, Wace & Holdgate 1976).

I counted the birds in each colony individually with the exception of West Jew's Point where numbers were estimated from offshore, from reports by islanders and by deduction from the number of eggs harvested there. In 1973 the Tristan population (breeding pairs) comprised: Trypot 2,000; Stony Beach 1 500; Goat Road Gulch 1 000; East End of Sandy Point 800; Big Gulch 750; Stony Hill 600; Phoenix Beach 250; West Jew's Point *c.* 100; Bluff West of the Pot 2. The last locality may be a new colony.

On Nightingale Island the colony covered five hectares and since one pair were found to occupy *c.* 2 m^2 this makes for *c.* 25 000 breeding pairs. On Middle Island the colony also supported around one pair 2 m^2 and covered 20 hectares giving a population of *c.* 100 000. Elliott (1957) estimated there were 25 000 on Inaccessible and Swales (1965) estimated two million for Gough. I have been unable to check either figure.

Mortality

It has long been suspected that penguins on the outlying islands are taken illegally for crayfish bait. In September 1973 and 1974 Sergeant Major's colony on Nightingale, which can provide 10 000 eggs, was deserted. Clubs were found in this colony and also at Middle Island, where dead penguins with head injuries were also found. I found more clubs at Salt Beach Colony at Inaccessible. The master of one of the local fishing boats was prosecuted in March 1973 for being in possession of some 200 penguins for use as crayfish bait. A post mortem of 60 revealed blunt trauma to the head and neck.

In the mid-sixties a landslide wiped out a third of the Trypot colony on Tristan. Flash floods may inflict considerable damage to those birds nesting in the floors of streambeds (gulches).

In 1972, 1973 and 1974 severely oiled Rockhopper Penguins were found on the Settlement beaches at Tristan and less heavily contaminated birds were seen in the colonies on Nightingale. The nearest oil tanker route passes a few hundred kilometres to the north of Tristan although the occasional vessel relieves the monotony of the passage between South Africa and Argentina by coming close to the islands.

Oil pollution has proved to be a real hazard in South African waters to Jackass Penguins *Spheniscus demersus* (Westphal & Rowan 1970) and to Magellanic Penguins *S. magellanicus* along the coast of Argentina (Jehl 1975). It is indeed disappointing to now

record its occurrence in such a remote part of the South Atlantic. If a major slick was to occur in Tristan waters it could endanger many seabirds, particularly since several species gather in enormous rafts. At greatest risk are the penguins since they are perhaps less able to avoid such a hazard. Little Shearwaters, Common Divingpetrels and Whitefaced Stormpetrels were also found oiled during 1972-1974.

Taxonomy and morphology

Carins (1974) has suggested that there are two races of Rockhopper Penguins in the islands. He classifies the Gough birds together with those at the Falkland Islands, Staten Island and New Amsterdam as *E.c. chrysocome*, on the basis of a dark skin margin around the bill. This distinguishes them from 'light-faced' birds *E.c. filholi* at other stations. He assigns the birds from Inaccessible to the race *E.c. moseleyi* being "dark faced but visually distinct on characteristics of the crest". He does not define the characteristics or refer to a photograph of Inaccessible birds, although he uses photographs to classify the birds from other localities.

I found that adult breeding Rockhopper Penguins, at the five islands on which they occur, were similar in respect of having dark skin adjacent to the bill and having full and long crests. Likewise other racially diagnostic characters, such as overall body size and the pattern on the undersurface of the flipper, are similar. The breeding season of the Gough penguins is later than that of penguins in the northerly islands, as is the case with several other species.

I suspect Carins (1974) has oversimplified the classification of Rockhopper Penguins. It may be that in addition to the dichotomy existing between light and dark faced birds the latter must also be subdivided into long-crested and short-crested forms. Photographs of birds from the Falkland Islands by Woods (1975, p.70) show them as dark-faced, but with slender, short plumes. Photographs of birds at Gough Island by H.R.H. Prince Philip (1962, pl.2) and at New Amsterdam by Segonzac (1972) show them as being dark-faced but with fuller, longer plumes. In fact the longest plumes of these latter birds can stretch from their origins almost to the tip of the beak or beyond. This is quite apparent on photographs taken of the lateral aspect of the birds.

Rand (1954) distinguishes Rockhopper Penguins at Marion Island from those at the Crozets, Heard and Kerguelen by their larger plumes. It is likely that the Rockhopper Penguins of the temperate islands of the Atlantic and Indian oceans are distinct from those from higher latitudes. I therefore conclude that all the Rockhopper Penguins in the Tristan group and on Gough belong to the race *moseleyi*.

A partial albinistic adult found on Nightingale had a white rump and back and very little black on the inside of the flippers, similar to the bird recorded by Roberts (1948).

Wandering Albatross *Diomedea exulans*

Local name: Gony

Population

I was unable to reassess the population, either on Inaccessible, where it was estimated by Elliot (1957) as two or three pairs, or on Gough where it was thought to be 2 000 pairs by Verrill (1895) and Wace & Holdgate (1976). Elliot (1957) hoped that it might re-establish itself on Tristan and he reported increasingly frequent landings on the west side of the island in the 1950's. However, I neither saw nor heard of any landings in 1972-74.

Morphology

Elliott (1957) noted that the eyelids were blue in life; however I saw several adult male birds with pink-rimmed eyes. I did not see any birds in wholly white plumage at Gough Island.

Yellownosed Albatross *Diomedea chlororhynchos*

Local name: Molly

Population

Wace & Holdgate (1976) estimated that there were 1 000-2 000 pairs on Tristan in 1968 and that this population might be threatened. I visited all quarters of the island on numerous occasions between 1972 and 1974 and found that numbers had certainly increased dramatically since Elliott's (1957) estimate of 3 000 pairs in 1950-52. This is possibly due to the cessation in egg collecting on the main island. I counted flocks of 1 000 birds on occasions and on one September morning I recorded six such flocks in the SSE corner of the island. In total I tnought 16 000 - 30 000 pairs were breeding on Tristan in 1972-74 (Table 3).

The numbers on Nightingale have most certainly decreased substantially in the last quarter of a century. The islanders themselves nave recognized this decrease and have imposed a temporary ban on egg collecting; Wace & Holdgate (1976) reported there were only 500-1 000 occupied nests in March 1968. I counted 3 000 pairs in and around the four Molly Ponds and half as many again were estimated over the rest of the island. Second Pond, where the taking of chicks and eggs is largely forbidden, supported 1 000-1 200 pairs in 1972-74, which is much the same as Rowan's (1951) count for 1949.

Middle Island has a population of 100-200 pairs and Stoltenhoff 500 pairs. I was unable to reappraise Inaccessible's population estimate by Elliott (1957) of 1 400 pairs. The estimate for Gough of 1 000 pairs by Elliott (1957), where they are at least as common as the Sooty Albatross, is too low. At least 5 000 - 10 000 pairs exist there.

Segonzac (1972) records 15 000 pairs at New Amsterdam and seven pairs at St. Paul. Van Zinderen Bakker (1971) records 2 000 pairs at Prince Edward Island. The Tristan group and Gough are thus the most important breeding stations with 27 500-46 000 pairs out of an estimated world population of 44 507-63 607 pairs.

Eggs

Elliott (1957) gives the average dimensions of 16 eggs as 68 x 64,3 mm, the 68 presumably being an error for 98. The measurements of 27 eggs are given in Table 3.

Longevity

A breeding adult ringed on Nightingale in February 1938 by the Norwegian Expedition (Hagen, 1952) was found there on 4 September 1974 in Second Pond, an interval of 36 years.

Voice

There are many variations of the "high-pitched clattering cry" described by Rowan (1951). It is often abbreviated and may also be a very prolonged monotonous low-pitched croaking. Whereas the call is usually delivered by a pair on land during courtship or by single immatures who are inviting mates, it is also given on the water when small parties gather. When flying over breeding areas birds (possibly immatures) may call out with the head flexed on an extended neck, the tail fanned and the legs drooped.

Sooty Albatross *Phoebetria fusca*

Local name: Peeoo

Population

The population of the Sooty Albatross on Tristan is only about one tenth of that of the Yellownosed Albatross and was estimated by me to be 2 000 - 3 000 pairs, representing an increase of at least two thirds since 1952. The population on Nightingale, where they breed on the High Ridge, Ned's Cave, the Seahen Rock and in scattered pockets over the island is 100-200 pairs. There are none on Middle Island and there are 25-50 pairs on Stoltenhoff. Elliott (1957) gave the Inaccessible population as 2 000 pairs. At Gough there were 350 breeding pairs on the seacliffs between Standoff Rock and the Admiral alone representing less than 5 % of the coastline. They were abundant on the inland cliffs also and I thought there were between 5 000 - 10 000 pairs on the whole island. The population for the Tristan group and Gough is thus an estimated 9 125 - 15 250 pairs. It is likely that they are biennial breeders and that the above figures constitute only half the breeding population.

At Marion and Prince Edward Islands there were estimated to be

TABLE 3

MEASUREMENTS OF FRESH EGGS OF THE YELLOWNOSED AND SOOTY ALBATROSSES

	Yellownosed Albatross				Sooty Albatross			
	Mean	S.D.	Range	Number	Mean	S.D.	Range	Number
Length (mm)	95,3	3,8	89,3-101,2	27	101,7	2,9	93,6-106,2	40
Width (mm)	62,6	2,2	56,5- 66,5	27	65,2	2,1	58,9- 69,7	40
Mass (g)	212	14	184-238	22	240	16	216-274	

1 000 pairs by van Zinderen Bakker (1971); Segonzac (1972) estimates the breeding population of East Island, Possession Island, New Amsterdam and St. Paul as 500, 200, 100 and 20 pairs respectively. Excluding a probably small number of unexplored islands in the Crozet Group, this gives a world annual breeding population of 10 945 - 16 070 pairs and establishes the Tristan group and Gough as the most important breeding stations.

Breeding cycle

Unlike Elliott (1957), I did not see any Sooty Albatrosses ashore between 1 June and 31 July in 1973 or 1974. Occasional birds were seen offshore throughout August. Aerial courtship and coming on land were first observed in September. Nests were prepared from mid-September onwards and between 2 and 13 October 1974 I collected data from 64 nests. Most eggs were laid around 2-4 October. The peak of hatching occurred around mid-December and chicks were brooded for about two weeks. Elliott (1957) gave chick departure dates from 9 - 26 May; most leaving by 15 May. I considered that the majority left on 16 - 20 May, giving an incubation period of about 73 days, and a chick-rearing period of 151-154 days. The whole breeding cycle is 9-10 months and it is unlikely, therefore, that successful breeders could recuperate physiologically to breed the next year.

Breeding habitat

Breeding occurs from 15 m to 1 200 m a.s.l. and not 200-800 m as reported in Wace & Holdgate (1976). The nest itself varies from a mere scrape in sand or gravel to a high truncated cone of mud and vegetation. The structure and composition of the nest depends on the availability of materials immediately adjacent to the nest site.

Sooty Albatrosses prefer to site their nest on an exposed steep slope or adjacent to a ridge in order to facilitate take-off whereas Yellownosed Albatrosses nest on flatter areas and amongst undergrowth. In the areas of overlap some Sooty Albatross nests have recently been usurped by the increasing numbers of Yellownosed Albatrosses at Tristan. The latter species has the advantage of commencing nesting activity usually just prior to the Sooty Albatross and is thus already in occupation when the Sooty Albatross returns.

On Tristan the majority of Sooty Albatrosses nest in clusters (locally known as "rookeries") of two to five pairs.

Eggs

The variable amount of reddish spots on the eggs has previously been noted. As with the eggs of Yellownosed Albatrosses, a large amount of pigmentation is superficial so that the older eggs are less well marked as the spots are abraded. Measurements of 40 eggs are given in Table 3.

Morphology

The islanders report that albinistic or markedly leucistic birds are very rare. I found one recently fledged juvenile with a pure white crown trailing to a broad "spectacle" around the back of one eye. The only difference in plumage between recently fledged juveniles and adults is that juveniles have buffy eye rings whereas adults have white eye rings. Other variations such as Elliott's (1957) description of the young Sooty Albatross as being pale-backed refers only to a nuance of shade. Murphy (1936 p.497) reports immature birds with a "buffy collar, whitish nape and brownish shafts to the quills". Such a plumage is not seen in recently fledged juveniles in the Tristan group or Gough, nor in immature birds that return in prebreeding years. Such plumage might describe the juvenile in abraded first contour plumage or it may have resulted from confusion with the Lightmantled Sooty Albatross. In good conditions, the very contrasting pallor of the mantle and back of the Lightmantled Sooty Albatross makes it easily distinguished from adult, immature or juvenile Sooty Albatrosses.

It has not been previously recorded that the yellow sulcus of the adult bird is continued into the gape. The upper gape is thin and overlapped by feathers, the lower is seen as a prominent yellow streak when the bird gapes and snaps on the nest. The inner aspect of the gape is mottled brown.

Sexual dimorphism

There was no overlap between the sexes in the size of the culmen in a small sample of 12 adults, sexed by dissection. Five male culmens averaged 116 mm (range 113,5 - 121) and seven females 108 (range 103-109,5 mm). The only reported male with a culmen of less than 110 mm is one collected by Holgerson (Hagen 1952). Murphy (1936) compared 13 specimens, but included birds of uncertain sex, which perhaps served to negate any differences. Females tend to be lighter though there is considerable overlap. Seven females weigned 1 800 - 2 800 g (mean 2 300 g) and five males weighed 2 400 - 2 900 g (mean 2 600 g).

Diet

Mixed flocks of Sooty and Yellownosed Albatrosses, Great Shearwaters, Antarctic Terns and Common Noddies were not infrequently seen foraging on fish shoals in the kelp belt offshore. The Sooty Albatross is usually indifferent to ships, though it occasionally follows for a while, often well behind in the wake. It rarely scavenges from the local fishing ships, unlike Wandering, Yellownosed and Blackbrowed Albatrosses.

The stomach contents of 12 adults and 29 chicks were examined. Ten stomachs were empty and of the remainder, all but one (97 %) contained cephalopod beaks 5-35 mm in length. Bird remains were found in 23 (74 %) and were the sole content of one stomach. Remains of the following bird species were identified: Great Shearwater, Broadbilled Prion, Rockhopper Penguin, Common Divingpetrel and *Fregetta* stormpetrels. Fish remains were found in 10 stomachs (32 %) and varied from 50 -

200 mm in length though some of the remains represented fish of a much greater size. Crustaceans were tentatively identified only once. Algae, especially red seaweed, vegetable matter, and earth and gravel were found in the stomachs of incubating birds.

The volume and mass of food which a Sooty Albatross can ingest is considerable. An islander told me of a chick regurgitating a whole adult Rockhopper Penguin skin - at their most emaciated a Rockhopper weighs 1,4 kg. One stomach I examined contained two complete adult Great Shearwaters as well as numerous cephalopod beaks. Their voluminous stomach and small gizzard appear able to digest bones and cephalopod beaks in most instances. The young solicit and accept food in the same manner as do Yellownosed Albatross chicks.

Chick growth and plumage development

Measurements of eight chicks at different stages of development appear in Table 4. Contour feathers first appeared on the scapulars and mantle at around 10 weeks. They are a lignt sooty grey with a marked sheen. Next to appear are the primaries, a very dark sooty grey, after which the flank feathers emerge, then those of the tail, neck and nead. By 17 weeks the down is lost from the back, the longest primary feather is 140 mm and the tail feathers are just appearing through the down. By 19 weeks the buffy and sooty brown of the adult plumage is apparent but down is still adherent, thickly or in patches, to the contours of the forehead, crown, chin, throat, neck, flanks, breast, rump and under-tail coverts. Most of the wing down is on the underwing coverts particularly towards the trailing edge. The belly is the last to lose its down and at 21 weeks very little, if any, remains.

Voice

The call of the Sooty Albatross is described as a bisyllabic 'heartrending scream' by Elliott (1957). However the most usual call is a trisyllabic one. The "peeee aaaaaaaargh" (hence Peeoo) delivered with the bill pointing skywards is immediately followed by a diminuendo note with the bill held against the breast similar to the sound of bagpipes running down. The third syllable carries only 50 - 100 m under good conditions whereas the first two syllables may be heard 1,5 km away. Adults produce a variety of grunts and squawks when fighting amongst themselves or when harrassed by man. There is considerable variation in the length, quality and pitch. Immature birds in aerial courtship were also heard to call out a muted "aaaaargh", as they touched or stretched out to touch the tail of the leading bird. Chicks emit a "hweet" when small and a variety of squawks when older. As they assume their contour plumage their cry approaches that of adults, although it remains a muted version.

Display of mature birds

The courtship of the Sooty Albatross takes place at the nest site and in the air and the form of courtship is similar to that

TABLE 4

DIMENSIONS OF INDIVIDUAL SOOTY ALBATROSS CHICKS AT TRISTAN DA CUNHA

Date	Age (days)*	Mass(g)	Culmen(mm)	Tarsus(mm)
29 Dec	1	240	40	26
31 Dec	15	620	55	35
24 Feb	70	2 835	91	72
13 Apr	118	2 780	100	76
29 Apr	134	2 950	106	80
29 Apr	134	2 210	104	79
12 May	147	3 060	105	78
13 May	148	-	112	80

* Assuming a hatching date of 16 December, except for the chick measured on 29 December which was less than one day old.

of the Yellownosed Albatross described by Rowan (1951). The sex of the birds was initially determined by dissection; later I felt it sufficient to identify the sexes by their culmen length. Birds with a culmen less than 110 mm were presumed to be females and those greater than 113 mm were presumed males. The male returns first to the nest site, and is then joined by the female who usually sits on the nest during courtship. The male then walks round the nest. Bill touching and fencing, tail fanning, mutual nest building and mutual preening, especially round the eyes and side of the head, is interrupted by calling from both partners. Copulation was only observed once and took place on the nest. The male rested his tarsi astride the female's scapulars. Throughout copulation the male raised and lowered his head, dropping his bill on alternate sides of the female's breast, brushing his bill against her breast. Selfpreening, shuffling, wingflapping and yawning were also observed during courtship.

Aerial courtship was observed among nonbreeders but I do not think it was a phenomenon restricted to the immature population. Members of a pair pursue each other, often at very close quarters, over the breeding cliffs. Every slight deviation of the leading bird is mimicked synchronously by the trailing one. Usually the only sound is of air whistling through their flight feathers.

Adult birds defend their nest by gaping and snapping, showing their gape and sometimes by regurgitating. The neck feathers bristle and the wings are abducted to synchronize with the snapping bill while the bird remains seated. This display is quite unlike that of the Yellownosed Albatross which holds in its wings and brays when approached.

Behaviour of immature Yellownosed and Sooty Albatrosses

Amongst the Yellownosed and Sooty Albatross at the Tristan group there are birds whose behaviour contrasts with that of breeding birds but which cannot, however, be singled out morphologically. I refer to these individuals as immatures.

They are present in large numbers on land only during fine weather when they make up about one third of the total population ashore. They arrive with or, possibly, shortly after, breeding birds and they abandon the breeding grounds at the end of January when the chicks are no longer brooded. Much of their time is spent in the company of adult birds.

Adult birds on land are placid and easily approached from September onwards although they will defend their nest site against intrusion. Immatures, however, are restless throughout the season and quickly become aroused and fearful when threatened. They do not snap and gape like adults and are very ready to take flight.

Adults characteristically court beside their nest whereas a nest site is rarely used by immatures. Immature Yellownosed Albatrosses often frequent knolls covered in grass and moss which rise above the surrounding vegetation. These noticeable features of the Base plateau on Tristan are called "molly knobs" by the islanders. Immature Sooty Albatrosses usually frequent

a cliff edge or an exposed ridge, sometimes using a ledge where there is not even sufficient room for a prospective mate to land. If a nest site from the previous year is employed it is usually adjacent to that of breeding birds but the nest is left in its dilapidated state or only desultory efforts are made to renovate it.

The courtship of adults involves only two birds. Groups of up to six are not uncommon amongst immatures although two to three birds is the norm. There is often an interchange between groups, new individuals joining and others leaving. The courtship display of mature birds of both species is a complex and accomplished performance. In immature birds such displays are less developed. Immature Sooty Albatrosses attempt aerial courtship but the subtleties of the adult performance are lacking. Individuals lack persistence and fail to execute each minute turn of the leading bird.

Bill fencing among adult birds is an orderly, polished performance whereas immature birds fence in a startled jerky manner and often make it a very protracted performance; sometimes fencing is the sole piece of behaviour. Prolonged touching of bill tips, "kissing", is common in immature Yellownosed Albatrosses and may last up to 20 min before the birds separate. Concurrently they shuffle around in circles, with tails fanned and alternately raising and dipping their heads. This prolonging of one theme of the display is not seen in breeding adults.

Adult birds are heard infrequently after November but immatures are much noisier and continue until January though their cries are usually more muted and are either abbreviated or extended. One pair of young Yellownosed Albatrosses kept up a monotonous wooden croak without variation for 20 min. Immature Yellownosed Albatrosses call from the air and also cry out whilst in small rafts on the sea. Immature Sooty Albatrosses were heard to call a very quiet 'aaaaargh' during display flights. Chicks of both species call out indiscriminately to all passers-by of their own species and one young Sooty Albatross was observed to call as a Yellownosed Albatross flew overhead.

Copulation is rarely seen amongst nonbreeders. Amongst adult birds it takes place on or beside the nest and is invariably preceded by mutual preening of the head, neck and scaplulars. Mutual preening, is less common among immatures. When they do engage in it, it is cursory in nature and often interrupted by very agitated fencing.

All the behaviours referred to above are graded characteristics and there is obviously a transitional group between immatures which fail or do not attempt to breed, and mature breeders. The immatures of both species do on occasion lay eggs, but not in nests. Such eggs are soon abandoned. Some Yellownosed Albatrosses lay in poorly constructed nests which subsequently disintegrate and sink into the 'Molly Ponds' at Nightingale Island. A large number of well-constructed nests was found in December 1973 on the Base at Tristan with broken eggs and abandoned chicks. These were all found on the periphery of the large expanding colonies at Joey's Garden. Towards the centre of such colonies egg breakages and mortality of chicks were less

noticeable. It is possible that less experienced breeders occupy peripheral areas and that this transitional group has a lower breeding success.

Parasites and disease

Nematodes in the stomach and cestatodes in the intestines were common in adults and juveniles on Tristan in 1972-74. At St. Paul and Amsterdam Segonzac (1972) noted roundworms which he thought were incidental parasites. At Tristan, mites, Mallophaga and ticks, Ixodoidea are frequent ectoparasites. One bird had a large cystic supraorbital swelling probably related to tick infestation and another had a large proventricular ulcer.

Southern and Northern Giant Petrels

Macronectes giganteus and *M. halli*

Local names: Stinker or Nellie

I only noted this taxon as it scavenged around our ship at Gough Island and when it visited the northerly islands. Swales (1965) recorded between four and possibly 60 nests of giant petrels at Gough Island and no more than 200 birds for the total population. At the time of writing, the taxonomic status of this population remained uncertain (Johnstone *et al.* 1976), but they are probably of the Southern species.

Atlantic Petrel and Greatwinged Petrel

Pterodroma incerta and *P. macroptera*

Local names: Biggest Whitebreasted Black Haglet or Biggest Whitebreast and Black Haglet.

Populations

Swales (1965) and Elliott (1970) thought the Atlantic Petrel to be the commonest large petrel on Gough Island, and that both Atlantic and Greatwinged Petrels were abundant. I estimated both populations there to be of the order of one hundred thousand to one million pairs. On Tristan, I estimated that there were only 100-200 breeding pairs of Atlantic Petrel and 1 000-3 000 of Greatwinged Petrel. Both may breed in small numbers on Inaccessible Island.

Breeding cycles

Previous accounts of the breeding cycle of the Atlantic Petrel are conflicting. Hagen (1952) notes that islanders reported laying in February, March and June. Swales (1965) conjectured a moulting period from April to June with nesting in July and August and interpreted some of Hagen's data to suggest a laying date in April. Yet he recorded three downy juveniles on 11

January. He concluded it was an earlier breeder than the Greatwinged Petrel. Elliott (1957) recognized the similarities between the two birds and thought they had an identical breeding season, laying from mid-June to mid-July.

My data suggest that on Tristan the Greatwinged Petrel leaves in mid November and reappears in mid March. It has a prelaying absence at the end of May and beginning of June. Peak laying is in the second week of June, hatching around the beginning of August and fledging in the second week of November. Immature birds leave in the first week in August. The Atlantic Petrel's breeding cycle is later and longer. On Tristan it leaves around mid December and reappears in mid March. I did not ascertain the timing of the prelaying absence. Peak laying is at the end of the first week in July, hatching at the beginning of September and fledging possibly around mid December. The breeding cycle for both birds may be two to four weeks later at Gough, as is the case with Rockhopper Penguins and Yellownosed and Sooty Albatrosses.

I was able to make some assessment of the Greatwinged Petrel's breeding cycle at Tristan based on their numbers and their vocal activity. On 12 March 1973 many reappeared and their noisy progress from the shore to the nesting grounds above Edinburgh Settlement could be heard from mid March until the beginning of August. The peak activity was from April to the last week in May when there was a lull until 5 June. This lull perhaps coincided with the prelaying absence. Activity from 5 June until the first week in August was at a much lower level which coincided with hatching and the probable departure of the immature birds, for calling occurred only occasionally thereafter.

I blew clean, fresn eggs of the Greatwinged Petrel on 17 and 24 June. Barrow (1910, pp. 41 and 47) provides the only other published dates of fresh eggs: 24 May, 13 and 22 June. This suggests an approximate mean laying date of 8-9 June. Elliott (1957) found three half incubated eggs on 10, 11 and 26 July. I found eggs starting to pip on 28 July and 4 August. Imber (1976) states that the mean interval between the first cracks and hatching is five days in Greyfaced Petrels *Pterodroma macroptera gouldi*. Assuming a similar interval for Greatwinged Petrels, this gives an estimated mean hatching date of 5-6 August and an incubation period of about 58 days. Elliott (1957) found one chick on 6 August which was thought to be less than a week old. He thought the departure of the chicks was between 4-15 November, giving a mean flying date of 9-10 November and a mean chick rearing period of 96 days. Andrew Glass (pers. comm.) observed one chick from an egg which started to pip on 28 July until it flew on 14 November, giving a chick rearing period of 104 days.

The first few Atlantic Petrels returned on 12 March 1973 although throughout this month they were outnumbered 20 to 1 by Greatwinged Petrels. The ratio dropped to 10 to 1 throughout April and May but by the end of June numbers of Atlantic Petrels increased. From June to August they were frequently seen in the factory searchlights, where, incidentally, they were more easily grounded than was the Greatwinged Petrel. By the first week in August the numbers of Atlantic and Greatwinged Petrels were approximately the same. On 29 August 1973 I saw a passage

of many hundreds of Atlantic Petrels off Tristan and thereafter there were far fewer birds offshore in the evenings. This was thought to correspond with the departure of immature birds. Their departure may serve to reduce intraspecific competition for food while adult birds are rearing chicks. I recorded no adult birds in the inshore zone after 16 December.

Andrew Glass (pers. comm.) reported two Atlantic Petrel eggs laid on 27 or 28 June. I found one clean, fresh egg on 9 July which could not have been older than a week. I blew another on 28 July which I thought to be about 10 days old. Another egg, more than half incubated with a well-formed downy chick, was collected on 19 August. Elliott (1957) dissected a postgravid female on 23 July judged to have laid its egg two to three weeks earlier. He also collected a fresh egg on 18 July. I witnessed one egg starting to hatch on 24 August and an islander watched an egg whose shell was beginning to rupture on 31 August. Assuming a pipping period of five days this would give a mean hatching date of 1-2 September and an incubation period of about 56 days. I did not record any Atlantic Petrels in the inshore zone after mid-December. If this coincides with the departure of the adults and chicks then the chick-rearing period may be about 106 days.

Swales (1965) found three downy juveniles at Gough Island on 11 January, suggesting that the breeding season is later there. However, measurements of an Atlantic Petrel chick, collected by P.D. Shaughnessy on Gough on 2 November 1970, were similar to those of a chick I examined on Tristan on 28 October, suggesting there is no great disparity in breeding seasons between the two islands.

Nests

There is very little difference in the nesting habits of the Atlantic Petrel and the Greatwinged Petrel on Tristan. I examined 14 nests of the Atlantic Petrel, seven of which were located between 30 m and 120 m a.s.l. and seven between 500 m and 600 m a.s.l. Two nests were in natural chambers under boulders, the others were in burrows varying in length from 0,5 m to more than 2,5 m. Entrances to burrows varied from 160 - 300 mm in diameter and the burrows inclined at 0-80° to the surface with the majority from 0-10°. The nest chamber was usually very expanded and it and the burrow were lined with vegetation and white feathers. This latter feature perhaps indicates a body moult prior to egglaying. The presence of white feathers help to distinguish Atlantic Petrel burrows from those of Greatwinged Petrels, since on two occasions I found both species in the same colony. Four nests were among Blechnum sp., one in *Blechnum* plus *Empetrum* sp., and the others among a mixture of *Empetrum*, *Histiopteris* sp., grasses and mosses. After hatching the adjacent foliage is sometimes drawn around the burrow entrance. All nests were on well-drained ground. Elliott (1957) states that most known Atlantic Petrel burrows were about 600 m a.s.l. on the seaward precipices, which is within the Blechnum zone. These details differ in no real way from the nesting habits of the Greatwinged Petrel, except that the latter is known to breed from 30 m up to 1 400 m a.s.l..

Eggs

The egg of the Atlantic Petrel is smooth, white and lustreless. The measurements of three were 71,2 x 51,5 mm; 73,5 x 49,0 mm and 72,5 x 49,0 mm (88 g) and of five Greatwinged Petrels' eggs: 68 x 48 mm (87 g), 68,2 x 48,3 mm (87 g), 66,4 x 46,9; 67 x 49 and 66,6 x 50,6 mm. Their mean dimensions, including the measurements given by Elliott (1957), are 71,7 x 50,4 mm and 68,0 x 49,5 mm for the Atlantic and Greatwinged Petrel respectively. Mathews (1932) attributed an egg measuring 61,5 x 48 mm to the Atlantic Petrel, but it is in fact, unlikely on size to belong to this species or to the Greatwinged Petrel.

Chicks

The chick of the Atlantic Petrel has not previously been described. Chicks in neonatal plumage were not discovered, but one about 57 days old, taken on 28 October, had a sooty mid-grey mesoptyle down. The iris was dark olive, the bill black with an orangey-flesh gape. The inside of the bill was pink. The tarsus was pale bluish-pink anteriorly, slightly darker on the sides and pale flesh behind. The anterior aspect of the toes was pale bluish-pink as far as the proximal interphalangeal joint beyond which it became deep brown-black. The outer toe was brown-black down the lateral aspect. The plantar aspect of the toes was pale flesh with moderate brown-black stippling over the interphalangeal joints. The webbing was pale creamy flesh on both aspects except for a faint brown-black stippling adjacent to the inner and middle toes and along the free edge. The claws were black. Younger chicks have less brown on the toes and older ones approach the leg colouring of the adults in having a pinker flush and more brown to the tarsi, toes and webbing.

The Greatwinged Petrel chick is only obviously different from the Atlantic Petrel chick in its leg colouring which is mid-grey to black. The iris and bill colour are similar. The protoptyle down of the Greatwinged Petrel is a sooty dark grey with blacker tones than the mesoptyle down. The latter is perhaps slightly darker on the throat than the Atlantic Petrel's mesoptyle down.

Growth of chicks

The growth of chicks of the two species is contrasted in Tables 5 and 6. The Atlantic Petrel appeared slower in developing. One had no primary quills at 57 days old. The Greatwinged Petrel, however, had long primary quills at 59-72 days. This suggests the latter species may have a shorter chick-rearing period.

The Atlantic Petrel lays a month later than the Greatwinged Petrel on Tristan and the chicks of the former leave the nest at least one month later. This staggering of the breeding cycle may serve to reduce interspecific competition for food.

Food

TABLE 5

DIMENSIONS OF INDIVIDUAL ATLANTIC PETREL CHICKS AT TRISTAN DA CUNHA AND GOUGH

Date	Age (days)*	Mass (g)	Culmen (mm)	Tarsus (mm)	Comments
3 Oct	32	400	27	33	No primary quills
3 Oct	32	500	29	39	No primary quills
3 Oct	32	400	30	39	No primary quills
28 Oct	57	350	33	40	No primary quills
2 Nov **	-	-	34	40	No primary quills
11 Jan ***	-	-	-	-	Three downy juveniles

* Assuming a hatching date of 1 September
** Collected by P.D. Shaughnessy at Gough
*** Gough specimens (Swales 1965)

TABLE 6

DIMENSIONS OF INDIVIDUAL GREATWINGED PETREL CHICKS AT TRISTAN DA CUNHA

Date	Age (days)*	Mass (g)	Culmen (mm)	Tarsus (mm)	Comments
4 Aug	0	200	21	23	No primary quills
22 Aug	17	500	32	38	Primary quill=6 mm
25 Aug	20	300	26	35	No primary quills
25 Aug	23 **	400	27	34	No primary quills
3 Oct	59	500	34	46	Primary quill=50 mm
5 Oct	61	350	34	43	Primary quill=73 mm
5 Oct	61	700	38	-	Primary quill=71 mm
9 Oct	65	-	33	40	
13 Oct	72 **	600	35	41	Primary quill=64 mm
14 Nov	104 **	-	-	-	Chick left nest

* Assuming a hatching date of 5 August
** Known to have hatched on 2 August

The stomach contents of six adult Atlantic Petrels examined in June and August and those of four chicks examined in October contained only cephalopods. Some contained very large tentacles and beaks and the ingestion of these is undoubtedly facilitated by the bird's ability to abduct the flexible mandibular rami resulting in a large gape. One adult bird could increase its gape from 18 mm at rest to 41 mm at full abduction. The Greatwinged Petrel's diet is also composed of cephalopods, although the contents of one of eight chick stomachs included numerous fish bones.

Voice

Swales (1965) records the voice of the Atlantic Petrel in its burrows as a "low drumming noise", although it is not clear whether he is referring to chicks or adults. Elliott (1957) describes the flight call as a lower pitched, more fluty version of the Greatwinged Petrel's "reepip-reepip-eeee-reepip". I could not separate the flight calls. The latter also has a short gruff cawing call. When disturbed on the nest the two are easily separated by the quality rather than the nature of the call. The Greatwinged Petrel has a highpitched, piping call "ki-ki-ki-ki-ki.....", sometimes interspersed with a wailing "kaaaa". The adult Atlantic Petrel gives a loud expiratory scream followed by a shorter inspiratory lower pitched call, not unlike a donkey's braying, which may be repeated "kaaaaaaar-haaa". Sometimes the second syllable is omitted. The voice of the Atlantic Petrel chick, like that of the adult, is harsher, lower pitched and more voluble than that of a Greatwinged Petrel of comparable age. At nine weeks old the latter delivers a thin, reedy, repetitive piping "si si si si", whereas the Atlantic Petrel has a distinct, harsh, rasping scream "kweeeee" and an aggressive "ki ki ki ki ki".

Morphology

The Atlantic Petrel is a large petrel, brown above with brown under tail coverts, brown under surface to the wings, a pale brown throat and, usually, a white breast and belly. The flanks are variously flecked with brown. An ill-defined black stripe extends from the eye to the ear coverts. The bill is black and the iris dark brown. The tarsus is pink with a variable stippling of brown anteriorly and over the tarsometatarsal joint. The tarsal pink extends to the toes and webbing which become deep brown beyond the proximal interphalangeal joint. The outer toe is wholly brown on its lateral aspect. Swales (1965) reports that some birds also have a grey chest and belly. Of four he collected for the British Museum, one has a terminal brown band to the feathers of the breast, belly and flanks, and another has a wholly grey-brown breast and belly excepting a small whitish patch at the junction of the breast and throat. A few islanders know of this dark form of the "Biggest White-breasted Black Haglet".

The Greatwinged Petrel is uniformly black and is slightly smaller than the Atlantic Petrel and has neither intermediate nor dichromatic forms.

Relationship between the Atlantic, Greatwinged and Whiteheaded Petrels

Murphy & Pennoyer (1952) regarded the Atlantic Petrel and the Whiteheaded Petrel *Pterodroma lessonii* as allopatric sibling species and the Greatwinged Petrel as a melanistic mutant. They drew together the resemblances of skeletal structure, plumage pattern, migration and nesting habits and demonstrated their close genetic ties. Since then the Whiteheaded Petrel and the Greyheaded Petrel of the Pacific have been closely studied by Warham (1967) and Imber (1976) respectively and reviewed by Serventy *et al.* (1971). In Table 7, Murphy & Pennoyer's observations, along with Warham's, Serventy's, Imber's and my own, are drawn together to extend the list of similarities. Murphy & Pennoyer (1952) had regarded the Atlantic Petrel as having one colour phase, as being a possible summer breeder and as belonging to subtropical waters. It is, however, polymorphic and a winter breeder. Furthermore W.R.P. Bourne (*in litt.*) has suggested that the Atlantic Petrel, like the Whiteheaded Petrel, disperses to higher latitudes in the summer and that the Greatwinged Petrel moves to lower latitudes.

These three species are reproductively isolated. Whereas they can be easily identified by their colouring, they are nearly indistinguishable in their structural characters and they have very similar behaviour patterns. I therefore consider the three to be sibling species. At the Tristan da Cunha islands, where the Greatwinged and Atlantic Petrels breed alongside each other, they show sympatric character divergence in respect of plumage, breeding season and migration habits.

Predation

The Atlantic and Greatwinged Petrels both suffer losses on Tristan from rats. The chicks may be especially vulnerable when first left unbrooded at a few days old. I removed several remains of dead chicks from burrows whose carcasses had been eaten by rats, which leave the bill and feet. Others had severe wounds to the skull and bill. The islanders report that feral cats hunt the birds in their burrows on Tristan. The Subantarctic Skua may be a natural predator but there is no evidence of this as yet on Tristan where the skua population is very low. However, Elliott (1970) and I found Subantarctic Skuas feeding on Atlantic Petrels at Gough in May and October respectively. The Greatwinged Petrel appears to be able to avoid predation by Subantarctic Skuas.

Kerguelen Petrel *Pterodroma brevirostris*

Local name: Blue Nighthawk

Population

Concurring with Swales (1965) observations, I found there to be vast numbers of the Kerguelen Petrel on both occasions when I visited Gough Island and estimated its breeding population to be anything from one to ten million pairs. It may possibly breed in small numbers on the five islands in the Tristan group.

TABLE 7

A COMPARISON OF THE MORPHOLOGICAL AND BEHAVIOURAL CHARACTERS OF WHITEHEADED, ATLANTIC, GREATWINGED AND GREYFACED PETRELS

Character	Whiteheaded Petrel	Atlantic Petrel	Greatwinged Petrel	Greyfaced Petrel
Near identical skeleton	X	X	X	X
Near identical egg	X	X	X	X
Similar mesoptyle down	X	X	X	X
One colour phase	X		X	X
Polymorphism		X		
Summer breeder	X			
Winter breeder		X	X	X
Mainly a burrow nester	X	X	X	X
Similar towering flight pattern	X	X	X	X
Does not follow ships	X	X	X	X
Preyed upon by skuas	X	X		
Voice very similar	X	X	X	X
Disperses to lower latitudes			X	X
Disperses to higher latitudes	X	X		

Breeding cycle

I was unable to add much to the few known details of the Kerguelen Petrel's habits in the islands and the breeding calendar is far from certain. I surmised egg laying to be in mid→October, hatching in early December and chick departure in late January. One adult male grounded on Tristan on 15 August had swollen white testes 13 mm long with a readily discernible vas deferens. A female killed on Tristan on 6 October had an ovary 9 mm long with small yolks and a straight dilated oviduct, whereas two females collected off Gough Island on the night of 28 → 29 October had ovaries of 17 mm and 18 mm long, one of which I recorded with a thickened, dilated and convoluted oviduct. A male caught the same night had shrunken red testes 3 mm long. It was reported to me that a juvenile with down adhering was caught at sea off Gough Island on 27 January. Swales (1965) caught 12 juveniles on 31 January at Gough. Elliott (1957) reported a juvenile taken from a burrow on Inaccessible in January which confirms the islanders' belief that it nests there. I agree with Elliott (1957) that it may well also breed on Tristan.

Soft Plumaged Petrel *Pterodroma mollis*

Local names: Littlest Whitebreast or Whistler

Population

Like the Kerguelen Petrel, it is a remarkably abundant petrel at Gough. Swales (1965) thought there were millions there. I conjectured from my visual impressions that there may be anything from one to ten million pairs. On Tristan it is a rare breeding species, largely because of rats, and its numbers I estimated to be 100 → 500 pairs. On Nightingale and Inaccessible its numbers are certainly greater: possibly 100 - 1 000 pairs. It may well breed on Middle and Stoltenhoff.

Breeding cycle

The breeding cycle of the Softplumaged Petrel is unclear. From published observations (Hagen 1952, Elliott 1957, Swales 1965, Elliott 1970) it appears to return to its burrows for cleaning and courtship from August to the beginning of November. It lays in November and December, and hatches around mid February to mid April. Chicks have been found in various stages of development from mid February to mid May. Chick departure occurs from the end of April to possibly the end of June.

I collected an adult male on 28 June on Tristan with testes 2→3 mm long. On the night of 28 → 29 October off Gough I examined two males, one with swollen white testes 11 mm long, the other with whitish→pink testes 7 mm long; also two adult females had ovaries 5→7 mm long with small yolks. Between 31 October and 3

November large numbers of Softplumaged Petrels were in their burrows at Gough Island but no eggs were found. A chick, which was covered in down except for its flight feathers, was found on Tristan on 21 April as well as a chick on 28 April which still had traces of down on its head and back.

As described by Elliott (1970), the Softplumaged Petrel nests at Gough on the southeastern plateau just inland from the cliffs and here I investigated numerous burrows. These varied from 150 mm to 2 m in length, with an entrance 100 - 125 mm in diameter. They were invariably shallow and terminated in an expanded nest chamber. A few birds remain in their burrows during the day at this time.

Voice

As well as the shrill whistling flight call, the Softplumaged Petrel also has a crescendo, moaning cry which is both reed-like and quavering. The docile courting birds in their burrows use the same cry delivered less volubly and have also a soft cooing note.

Predation

Large numbers are killed by Subantarctic Skuas at Gough Island.

Broadbilled Prion *Pachyptila vittata*

Local name: Nightbird

Population

On Tristan the Broadbilled Prion breeds from sealevel to at least 600 m and numbers thousands; on Nightingale and Inaccessible it occurs at least in the tens of thousands. It probably breeds on Middle Island and Stoltenhoff. At Gough Swales (1965) thought there were a conservative ten million pairs. I thought from my visual impressions of clouds of prions offshore around the whole island that it was undoubtedly the commonest petrel and that there were millions of pairs.

Breeding

The Broadbilled Prion lays in the second half of August, hatching is in the beginning of October and the chicks fledge in December. On 10 and 11 August 1973 quite unusually large flocks of several thousand prions were seen off Tristan. On 18 August two males had white testes 13-17 mm long and a female, which had just laid, had an ovary 12 mm long. On the same day no eggs were found at the Nightbird Cave on Knock Folly Ridge, Tristan, although four were found there on 24 August. I took an egg (50 x 35 mm) from a gravid bird on 20 August. On Nightingale on 11 and 20 September no eggs had yet hatched. On 21 October 1973 on Tristan two chicks were taken from nest cavities in the burrow of an Atlantic Petrel. They were a week or so old and both weighed 40 g, had culmens of 17 mm and tarsi

of 18,5 mm. At Gough, five females taken on 28-29 October had dilated, convoluted oviducts and involuting ovaries about 6 mm long, which supports egg laying having occurred about one month previously. A recently fledged downy juvenile was caught at the factory lights in Edinburgh Settlement, Tristan on 23 December 1973.

Voice and Habits

Their flight call is unlike the raucous, insistent courtship song being a low croaking "ggrarr ka ka". On Gough in November the occasional Broadbilled Prion flew overland by day and one was seen pursuing a Subantarctic Skua.

Whitechinned Petrel *Procellaria aequinoctialis*

Local name: Cape Hen or Snoemaker

There is a specimen record of this species from Gough taken on 23 April 1864 (Clarke 1905). Islanders thought they heard them in burrows at Gough in 1965, although Swales (1965) does not say he actually found the species on Gough Island. Between 1972 and 1974 three successive teams of meteorologists, reported that they breed in the highlands. V. Trollip (pers. comm.) reported to me that he photographed on Gough in 1974 a large black petrel with a white throat that was pulled from its burrow. I saw several offshore from Gough on 21 October 1972. The species visit the northerly islands where its appearance usually coincides with visiting ships. I saw 3 on 2 April and 13 April 1973. Breeding at Gough Island remains unproven.

The spectacled form *P.a. conspicillata* (local name "Ringeye"), of which according to Elliott (1957) there are only 100 pairs breeding on Inaccessible, is a rare visitor to the other islands. One emaciated adult female was collected on Tristan on 5 May.

Grey Petrel *Procellaria cinerea*

Local name: Pediunker

Population

The status of this petrel remains precarious on Tristan with no more than an estimated 50-100 breeding pairs. It has never been proved to breed on Inaccessible although it probably does. Since I was at Gough outside the breeding season I saw only an occasional bird offshore and none on land between 28 October - 4 November. Elliott (1970) thought it one of the most abundant species at Gough in May 1968 and Swales (1965) had found it abundant from 21 February onwards. From their data alone I guess there may be hundreds of thousands of pairs at Gough Island.

Breeding cycle

The six nests I found on Tristan were in the northwestern quadrant on steep seaward precipices between 300 + 600 m a.s.l.. They were dry open, cave-like structures under roots and overhangs in the fernbush. One had a distinctly elevated cup to contain the egg.

Elliott (1957) thought the breeding season was irregular and extended, in contrast to my limited data which suggest the opposite. Elliott (1957) Swales (1965), and I noted that the Grey Petrel returns to the islands at the end of February. Hagen (1952) obtained four adults from burrows between 28 February and 17 March and the islanders consider that egg laying occurs in April. I found one very clean fresh egg (measuring 81 x 54 mm) on 15 April and another, which was two thirds incubated, on 21 April and which must have been laid in March. Elliott (1970) found two eggs, of unknown maturity, on 6 and 10 May at Gough. Elliott (1957) gave two very late dates of fresh eggs as 3 June and 10 July. He found chicks between 6 June and 1 October and a fledgling on 15 September. I found chicks, whose growth patterns were in phase (Table 8), between 18 May and 25 August. A few islanders traditionally hunt Grey Petrel chicks in the last half of August which again suggests a fairly limited and well defined breeding season.

Swales (1965) recorded a juvenile at Gough on 10 December 1955 although he also said the first individuals to be seen were on 21 February 1956. His juvenile seems excessively late especially as he stated it was "apparently recently fledged". He does not say how this was apparent. On the basis of this one observation he surmised laying at Gough at the end of May, or early June.

My data suggests that Grey Petrels arrive at their nest sites on Tristan at the end of February, lay in March and April, hatch in June and July and fledge in September and early October.

Mathews (1932) describes an egg supplied to him by an islander as a "Nighthawk's" (Kerguelen Petrel) measuring 69,5 x 53,5 mm. He questions that it may belong to a Grey Petrel. However, it undoubtedly belongs to neither the Kerguelen nor Grey Petrel but most likely to the Atlantic Petrel.

Voice

A call not previously described for the chick is a thin piping "hi hi hi hi", although this call is in my experience common to all small petrel chicks. Larger chicks sound as if they suffer from serious asthma. The nesting adult has a resonant, throaty, droning alarm call "grrrrrrr", not unlike the start of a dog's growl.

TABLE 8

DIMENSIONS OF INDIVIDUAL GREY PETREL CHICKS AT TRISTAN DA CUNHA

Date	Mass (g)	Culmen (mm)	Tarsus (mm)	Primaries
18 May	300	30	34	0
24 Jun *	-	33	38	0
28 Jul *	-	41	51	9
18 Aug	1 100	45,5	60	-
19 Aug	900	45	-	-
25 Aug *	1 400	44	56	95

* same chick

Little Shearwater *Puffinus assimilis*

Local names: Whistler or Nighthawk

Population

I judged from sightings at sea that Little Shearwaters were sufficiently common at the northerly islands for there to be a few hundred pairs on Nightingale and Inaccessible. There may be a very few on Middle Island and Stoltenhoff. An islander reported taking one from a burrow on Tristan so it conceivably breeds there occasionally, as it surely did before rats came to the island. At Gough in late October and early November they were sufficiently common offshore for me to guess the population may be in the hundreds of thousands. This may well be an underestimate as Swales (1965) rates it as "extremely abundant", a term he also uses to describe Softplumaged and Kerguelen Petrels and the Broadbilled Prion, all of which I thought occurred in their millions. Indeed, Wace & Holdgate (1976) report Swales as saying these four species were probably to be numbered in millions.

Great Shearwater *Puffinus gravis*

Local name: Petrel

Population

Rowan (1952) assessed the population of Great Shearwaters on Nightingale as two million pairs with an average of one pair per square yard. At that time Nightingale was thought to be 2km^2 in area. The Royal Society Expedition of 1962 reassessed the area as 4 km^2 which thus allows for a revised population of four million breeding pairs. Approximately 10 ha of Middle and Stoltenhoff are burrowed by this shearwater to a density of around one pair per 2-4 m^2 giving populations of 25 000 - 50 000 pairs for each. Elliott (1957) estimated there were at least 150 000 pairs on Inaccessible. I considered there was that number on the east coast alone and that there may be up to one million pairs for the whole island. Elliott (1970a) estimated 600 000 to possibly three million pairs at Gough. With only one breeding pair recorded from the Falkland Islands (Woods 1975, p 89) this gives a Tristan and world population of 4 750 000 - 8 100 000 pairs.

Rowan (1952) doubted the islanders when they reported to her a small temporary breeding colony on Tristan at Anchorstock in the 1940's. Because several islanders, whom I found to be reliable witnesses, also reported this to me and because this species is well known to them I have little doubt myself that this was in fact the case. Throughout November and December 1973 a single individual could be seen flying from the Base cliffs over the settlement every morning, suggesting that the species may return to breed on Tristan.

Breeding cycle

No Great Shearwaters were seen in the inshore zone or on land at night at Gough Island between 29 October and 4 November. Their burrows, however, had recently been cleared out. Shaughnessy & Fairall (1976) noted they were absent from Gough between 13 October and 4 November. This confirms the islanders previously undocumented view that there is a prelaying absence.

Rowan (1952) believed there was a brief laying season in the first half of November. I found a few fresh eggs unchipped by Tristan Thrushes on 25 November above ground amongst the tussock on Nightingale.

Morphology

During the April and May 'fat trips' to Nightingale in 1973 and 1974 between 61 000 and 97 600 shearwater chicks were collected. Six of them were markedly leucistic. This gives an incidence of leucism amongst Great Shearwaters of 1 in 10 000 - 16 000. One live bird given to me was similar to that described by Elliott (1953). It was not clear from the islanders' accounts whether any truly albinistic individuals occur.

Greybacked Stormpetrel *Garrodia nereis*

Swales (1965) does not list the Greybacked Stormpetrel as a breeding species for Gough. On 28 - 29 October 1972 I found it to be numerous offshore. Two males collected had red swollen testes and two females had enlarged ovaries of 4 and 8 mm in length, although the oviducts were not prominent. They were judged to occur in their thousands. The species has been regularly collected from Gough both on land and offshore and I think that it must breed there. None was seen at the northerly islands.

Whitefaced Stormpetrel *Pelagodroma marina*

Local name: Skipjack

Population

Elliott (1957) considered the Whitefaced Stormpetrel may breed on Tristan, because of the August to October "wrecks" of birds in the settlement. I think this unlikely because of rat predation. Their occurrence on land at Tristan is simply because they are attracted to the village lights. They are common at Nightingale, Inaccessible and Gough and perhaps occur in their thousands at all three islands.

Breeding cycle

Elliott (1957) documented that they are a very early summer breeder but that their breeding cycle is undefined. They return to Tristan waters in August. One female caught in the village on 7 August had an 8 mm long ovary but no obvious

oviduct. A few birds were still present offshore on 18 February.

Feeding habits

Many hundreds of birds may be seen in the kelp belt off Tristan between mid November and the first week in January. Their feeding pattern was interesting in that as the flock advanced the leading birds dropped behind to the rear and the second line then took the lead.

Whitebellied Stormpetrel *Fregetta grallaria*

Local names: Skipjack or Stormpigeon

Population

The Whitebellied Stormpetrel is not nearly as common as the Whitefaced Stormpetrel at Nightingale or Inaccessible. I guessed from visual impressions of it around the islands and from the few birds I caught on land that it occurred only in the hundreds. It probably breeds on Middle Island and on Stoltenhoff. At Gough, Elliott (1953) lists the Whitebellied Stormpetrel as fairly common and Swales (1965) rated it as abundant and the commonest stormpetrel. I did not come across this species at Gough.

Breeding cycle

The Whitebellied Stormpetrel is a late summer breeder. It is most frequently seen from January onwards at the northerly islands. Laying occurs in that month, hatching in March and most birds leave the islands towards the end of May. Elliott (1957) thought it to be absent from the group from June until December. This is not the case. I saw individuals and small parties on 29 June, 12 July and 15 September and caught one at the factory lights at Edinburgh Settlement, Tristan on 24 November. A fresh egg (measuring 36 x 27 mm) was collected on 5 February. It was being incubated by a male in a shallow burrow in loose rocks behind the shacks on Nightingale. Another nest in loose rocks on 19 March 1974 contained a chick whose plumage was visible through the down on its belly, mantle and primaries. Its culmen was 12 mm and the tarsus was 34 mm. One adult in brown, abraded plumage was caught on 4 May 1973.

Taxonomy

Bourne (in Palmer 1962) considers the Subtropical Whitebellied Stormpetrel to be possibly the main form at the northerly Tristan islands and the Subantarctic Blackbellied Stormpetrel *F. tropica* to be the prevailing type at Gough. He regards the *Fregetta* petrels as a hybrid population.

Common Divingpetrel *Pelecanoides urinatrix*

Local name: Flying Pinnamin

Population

At Nightingale, where I often saw parties of several hundred Common Divingpetrels feeding together, the species probably exists in the tens of thousands of pairs. I did not establish whether it breeds on Middle Island or Stoltenhoff. On Inaccessible I judged from their numbers offshore that they were in the thousands. At Gough they occurred in their hundreds of thousands.

Breeding cycle

Like Elliott (1957), I consider that Common Divingpetrels leave the islands, certainly from the inshore zone, during midwinter. It is a summer breeder and reappears in Tristan waters in great numbers in mid July. At Nightingale it lays in the first half of September. Two fresh eggs (measuring 37,0 x 29,2 mm and 37,6 x 30,2 mm, the latter weighing 20 g) were collected from Nightingale on 16 September 1973. The birds leave the northerly islands at the end of May. At Gough the breeding cycle may be several weeks later. One female caught offshore on the night of 28-29 October 1972 had enlarged ovaries with a prominent straight oviduct but had not yet laid, whereas another, with a dilated convoluted oviduct, had recently laid. The enlarged, white gonads of a male caught on 28-29 October were in a similar condition to those of two males taken from Nightingale and Inaccessible in late August.

Voice

From September to November breeding birds were heard calling outside their burrows. They employed a soft, attractive, reed-like crescendo num "mmmmmmm" which rose in pitch during the last third of the call. It was sometimes followed by a grunt.

Taxonomy

I collected five specimens of the Tristan population, which has been named *P.u. dacunhae* and five birds from Gough population which has been named *P.u. elizabethae* but, like Bourne (1968), I was unable to distinguish between the two collections.

Inaccessible Flightless Rail *Atlantisia rogersi*

Local name: Little Island Cock

Population

The Inaccessible Flightless Rail is confined to Inaccessible Island. Elliott (1957) estimated there to be at least three individuals per acre or between 5 000 to 10 000 in all. At

Salt Beach the population density varied between four pairs ha in the mixed luxuriant vegetation at the old potato garden to around one pair/ha in the neighbouring tussock. In a sample of around 100 individuals I sighted in January 1974, about 40 % of them, excluding chicks, were adult breeding birds. Using Elliott's figures this would give at least 1,5 pairs/ha , or 1 000 to 2 000 breeding pairs for the island.

Breeding cycle

According to Broekhuysen & Macnae (1949) and Hagen (1952), laying occurs from October to February. A brood of two precocial chicks captured on 17 January 1974 was one to two days old. Another brood of two larger downy chicks was captured on 18 January. One independent juvenile, with some down on the rump only, was caught on 16 January.

Morphology

My series of 15 rails allows for some clarification of plumage characteristics. Hagen (1952) thought there was an intermediate plumage which was sooty without barring and questioned whether birds in such plumage were sexually active. Elliott (1957) noted a slight but constant sexual dimorphism in intermediate and adult plumages: males having blackish ear coverts and cheeks whereas females had grey coverts and cheeks. From my observations I consider there is distinct sexual dimorphism and that there are three fairly easily distinguished plumages. These (the juvenile, immature and adult stages) can be classified according to the predominant colour and the presence of obvious white barring on the flanks and belly (Table 9).

The juvenile is black with a brown iris. Intermediates, which are sexually immature, can be separated by their grey plumage and the absence of obvious white barring. The immature females are a light to mid slate grey with a brown wash above and below. They have buffy or faint white ralline barring. The iris is brown or orange-red. Immature males are easily picked out in a series since they are a blackish grey, have no brown below, no barring and an orange-red iris. Adults are easily defined by obvious white barring in the flanks and belly. The brown on their backs is chestnut. They have a bright orange-red eye. The female is a lighter grey than the male, most noticeably on the head, throat and breast and has a brown wash below.

Gough Moorhen *Gallinula comeri*

Local names: Island Cock or Big Island Cock

Population

I estimated 12-20 pairs per km^2 on that half of Gough Island frequented by the Gough Moorhen (it does not inhabit the higher slopes above the tree and bog fern line). This gives a

TABLE

PLUMAGE, IRIS COLOUR AND THE LENGTH AND COLOUR OF THE GONADS OF INACCESSIBLE FLIGHTLESS RAILS COLLECTED ON 15-19 JANUARY 1974

Stage	Specimen number	Sex	Gonads	Colour of iris	Predominant plumage colours	Presence of barring
Chick	157,158, 159,160	-	-	dark brown	sooty black	-
Juvenile	161	M	2 and 2 mm, white	mid brown	sooty black	no barring
Immature	156	F	5 mm, yellow, flat	light brown	light slate grey with brown wash above and below, paler grey and brown below	very faint, buffy subterminal barring on wing and tail
"	169	?	unknown	mid brown	" "	more obvious buffy barring on wing, tail, flank and belly
"	173	F	11 mm, white, flat	bright orange-red	mid slate grey with brown wash, paler below than above	faint white barring to wing, tail and flank, not on belly
"	167	M	4 and 3 mm, white	bright orange-red	dark sooty grey with very faint brown tinge to back	no barring
"	162	M	6 and 4 mm grey/white	dark orange-red	" "	no barring
"	174	?	unknown	bright orange-red	mid sooty grey, more obvious brown wash on back than no. 167	no barring
Adult	163	F	10 mm, obvious yolks	bright orange-red	mid slate grey, brown wash above and below: brown is richer, or chestnut, on back	obvious white barring on wing, tail, flank and belly
"	164	M	4 and 3 mm, pink/black	bright orange-red	dark slate grey, chestnut brown above only: darker in general than female especially on head, throat and breast	obvious barring on wing, tail, flank and belly
"	165	M	4 and 4 mm,	bright orange-	" "	" "
"	166	M	3 and 3 mm	bright orange-red	" "	" "

population estimate of 300-500 pairs.

Breeding cycle

The breeding season probably extends from December to March, although meteorologists reported Gough Moorhens copulating on 13 June, 25 August and 30 August 1974. They reported chicks of a few days old on 1 January and 4 January 1973 and one on 29 March 1974. The latter was being fed by an immature bird. dissected two adult females in May 1973 which had atrophic ovaries.

Voice and habits

While I was there in November the birds called infrequently, giving only a loud resonant "koo-ik". A few birds around the meteorological base at Transvaal Bay were quite open in their activities though others were more skulking.

Flightless moorhens on Tristan da Cunha

The Tristan Moorhen *G. nesiotis* was presumed to have become extinct sometime towards the end of the last century (Beintema 1972a) due to hunting, predation by cats and rats and habitat destruction.

Following reports by islanders of flightless moorhens at Longwood, Tristan in March 1972, I made three visits to the area, in April and December 1973 and in February 1974. Five specimens were collected which are now in the British Museum (Natural History). The area inhabited by the moorhens at the time was about 8,5 km^2 and lies on the Base plateau between the cliff edge at 300 m and the tree and tree fern line at 900 m. Rats were plentiful and there were probably also a few feral cats present. There were additional reports of moorhens having been seen as far east as Big Gulch during 1972-74.

Morphology, field characteristics and voice of the flightless moorhens on Tristan

In the field the adult appears predominantly blackish brown with a black head, deep brown back and mid grey-black belly. The shield is red and the beak deep red with a yellow tip. The tibial garter is red and the tarsus yellow in front with red sides. The immature plumage, which is retained into the second year, is largely greyish brown. The head is dark sooty grey, the back chestnut brown and the belly feathers sooty grey with a faint creamy tip. The shield is shiny red and the beak dull dark red with a yellowish green tip. The tibia is orange red and the tarsus dark green. The juvenile is predominantly olive brown with a brown dorsum and pale brown belly with creamy tipped feathers. The shield and bill are dull green. The tibia is yellow and the tarsus is bright green. All three stages have white undertail bars.

The birds were secretive but very vocal, usually revealing their presence by their loud resonant cry. They were seldom seen in

the open, except at a distance, and they easily evaded capture by their speed and the cover afforded by the vegetation.

At the time of my visits the birds were in pairs or family units with juveniles or immature birds, which maintained a continual exchange of calls. They were much more vociferous in December and April than in February. Three calls could be distinguished. First was a staccato, high pitched, bisyllabic "koo-ik" or "oo-ik" delivered as a single utterance, or repeated every second or every few seconds. This call has a harsh quality, was very penetrating and carried several hundred metres. Individual birds changed their pitch frequently and different birds often had a different quality to their call. It was the call which appeared to invite reply since it was parried around constantly between individuals of a pair. If delivered with force then it seemed to be taken up by every bird in the area. Occasionally it was abbreviated to a monosyllabic "eek". The second call was a very loud, far carrying "koo-ik", koo-ik". This call was the least heard. The third call was a low-pitched, monotonous, whispered "ik-ik, ik,ik,ik," or "ook,ook,ook,ook,", heard only at close range, the syllables voiced at three per second and the whole call lasting 15-30 s. This call was only heard when members of a pair were close to each other.

Breeding cycle, food, the population and its origins

An adult male collected on 24 December had white swollen testes 18 mm and 15 mm long. Juveniles were found on 8 February and 29 April. This suggests an extended laying period from December to March. The birds may be double brooded.

Examination of four stomachs revealed numerous grass-like seeds 1 mm across, many dark brown seeds 3 x 4 mm, amorphous vegetable matter, egg shell and gravel. One stomach contained a cephalopod beak confirming that the birds scavenge around albatross nests.

The numbers were largely ascertained by observations in the Longwood area. The population density varied between 20-30 pairs per km , giving a breeding population of 170-255 pairs for the whole area.

The 1972-74 Tristan population must derive either from indigenous birds (*G. nesiotis*) previously thought to be extinct or from introduced ones (*G. comeri*) from Gough. Seven Gough Moorhens were released east of the Edinburgh Settlement on Tristan on 15 May 1956 (M.K. Swales *in litt.* to B.P. Watkins, FitzPatrick Institute). The present Tristan population may derive from one or both species of flightless moorhens. Study of the specimens I collected is required to ascertain to which of the two species the Tristan flightless moorhens belong.

Subantarctic Skua *Catharacta antarctica*

Local name: Seahen

Population

Only 5-10 pairs were present on Tristan in 1972-74 but these are

liable to become extinct due to persecution by the islanders. Adults, chicks and eggs are destroyed whenever possible by the islanders since they consider skuas predate lambs and chickens. On Nightingale there are 100-500 pairs; on Middle Island 1-10 pairs, on Stoltenhoff 1-5 pairs. Inaccessible I guessed may support 50-100 pairs and Gough has 2 000-3 000 pairs (Swales 1965).

Breeding cycle

Nine clutches were found, all comprising two eggs. The measurements of three eggs were 69,3 x 51,6 mm, 73,8 x 49,2 mm and 70,0 x 48,5 mm.

The nestling down is tawny brown and is slightly lighter on the belly. The bill is dark grey. The tarsus is pale grey and the webbings are pale creamy grey. The upper mandible of the juvenile is black and the lower mandible is slate blue with a black tip. The tarsi of the juvenile are a dark browny black with chalk blue mottling at the tibiotarsal joint. The webbing is black. A variable amount of blue grey is retained on the rami of the lower mandible in most adults. Occasional adults have pale grey mottling on the tarsus which are black or blackish brown.

Diet

The stomach contents of eight birds from Tristan included a whole Whitefaced Stormpetrel, small avian bones, a whole rat, sheep's wool and offal.

Taxonomy

Elliott (1957) agreed with Hagen (1952) in separating the skua at Tristan, *Catharacta antarctica hamiltoni*, from the Subantarctic Skua, *C.a. lonnbergi* of Subantarctic islands. The measurements of the Subantarctic Skua at various breeding localities is compared in Table 10. The longer wing of the birds at the Crozets, South Georgia and Australia may reflect differing techniques in measuring or may represent real differences. Despite there being six different authors compiling the series, mean lengths of tail, culmen, tarsus and toe of all the birds are within one standard deviation of the Tristan means. It is thus probably safer to refer the skua from the Tristan islands and Gough to the form *C.a. lonnbergi*.

Common Noddy *Anous stolidus*

Local name: Woodpigeon

Population

Some 30-50 pairs of Common Noddies breed in the northwest of Tristan, there are 200-500 pairs on Nightingale, none on Middle Island and possibly 100 pairs on the cliffs of Stoltenhoff. About 100 pairs nest at Salt Beach, Inaccessible, and I guessed

TABLE IO

DIMENSIONS OF SUBANTARCTIC SKUAS AT DIFFERENT LOCALITIES

Locality and Reference	Sample size	Wing (mm) length	Tail (mm) length	Culmen (mm)	Tarsus (mm)	Mid toe and claw (mm)	Mass (g)
A. Tristan da Cunha and Gough Islands							
This paper	15	392±8 (377-408)	158±8 (142-172)	55±2 (52-58)	73±2 (70-78)	81±3 (75-85)	1 300±190 (1 000-1 500)
Hagen (1952)	8	388 (378-401)	147 (134-161)	55 (54-57)	73 (71-75)	78 (73-83)	1 360 (1 170-1 480)
Elliott (1957)	6	389 (376-396)	154 (144-161)	53 (51-54)	71 (69-73)	79 (76-81)	-
B. Saint Paul and New Amsterdam Segonzac (1972)	8	396 (385-406)	-	53 (52-56)	73 (71-76)	-	-
C. Crozet Islands Segonzac (1972)	15	404 (390-420)	-	56 (48-59)	73 (69-76)	-	-
D. South Georgia Murphy (1936)	14	407 (397-416)	153 (143-162)	56 (53-58)	75 (71-79)	-	-
E. Australian seas Serventy *et al.* (1971)	33	418 (385-450)	159 (149-178)	56 (51-63)	75 (67-95)	82 (75-91)	-

a maximum for the island of 500 pairs. I estimated 100–500 pairs for Gough, based on a visual impression only.

Breeding cycle

The Common Noddy is a midsummer breeder. It reappears in September although only a few pairs had returned to Nightingale by 10 September 1974. I observed a movement of several hundred birds off Tristan on 10 February 1973 after which fewer birds were seen. One individual was noted on 6 May 1973.

Antarctic Tern *Sterna vittata*

Local name: Kingbird

Population

50–70 pairs breed in the northwestern quadrant of Tristan with only occasional pairs breeding elsewhere on the island. On Nightingale there are 100–300 pairs, on Stoltenhoff possibly 100 pairs and none on Middle Island. On Inaccessible from 100–400 pairs breed. Swales (1965) estimated 500 pairs along only 4 km of the southeast coastline of Gough. I thought there were between 500–1 000 pairs for the whole island.

Diet

Nine stomachs were examined. Five contained only small fish. Two contained fish and what were probably eye lenses. One contained eye lenses only and one contained amphipods.

Morphology

The moult into nonbreeding plumage was completed by half the adult Antarctic Terns by 20 April 1973. This plumage was retained until September or early October. The shortlived buff and grey plumage of the juvenile may be seen from late January until as late as 2 May. The greybarred juveniles were seen from March until September. Occasional second year immature birds, with their white forehead and underparts, were present on Tristan from October to March. Three were seen amongst a breeding colony of 100 pairs in January on Inaccessible. They are indistinguishable in the field from the Arctic Tern *Sterna paradisaea* which also has a white forehead and underparts in the austral summer and has been recorded at least twice in the islands.

Tristan Thrush *Nesocichla eremita*

Local name: Starchy

Nesocichla eremita eremita, resident on Tristan da Cunha

Population

Tristan Thrushes are tame and inquisitive and may thus appear

more common than is the case. There were only an estimated 40-60 pairs breeding on Tristan in 1972-74. About thirty of the deeper and more sheltered gulches each supported one family, a few other pairs live near smaller gulleys ("gutters") and there are several pairs in the conifer plantation and orchard at Sandy Point. Their numbers may be decreasing since Elliott (1953) recorded a few hundred pairs present on Tristan in 1950-51.

N.e. eremita spends most of the year above 300 m a.s.l. In severe winters it descends to lowlying areas though never to the beaches, which are a popular habitat of Tristan Thrushes at Nightingale and Inaccessible Islands.

Breeding cycle

Breeding begins later than in the other two races. Two well-incubated eggs were found on 31 December and two newly hatched young were found on 28 December. The chicks were sparsely covered in a golden tawny down; their bills were grey, the tarsi and toes greyish brown and the claws grey.

The nest is neatly woven of grass, lined with moss. One nest was found at 300 m a.s.l. in a bog fern; another was at 600 m a.s.l. on an exposed rock face; two others were well hidden under the edge of a bank of a gulch at 600 m and 1 000 m a.s.l.

Voice

Although normally silent the adults have a soft indrawn whistle and a "chirp", like the other two races. On two occasions in December whilst on the Base I heard a rich melodious flute-like song, which I did not hear from the other races.

Predation

They are vulnerable to predation by feral cats. In 1974 a cat's cache of five dead Tristan Thrushes was found on the Base. Now that the domestic cats of Edinburgh Settlement have all been killed, the feral population which were constantly being replenished by such animals, may die out. An overturned nest with two broken eggs may have been predated by rats.

Nesocichla eremita gordoni, resident on Inaccessible Island

Population

Hagen (1952) thought there were thousands of Tristan Thrushes on Inaccessible Island. I guessed there were perhaps 100-500 pairs.

Nesocichla eremita procax , resident on Nightingale, Middle and Stoltenhoff Islands

Population

There were approximately 300-500 pairs on Nightingale, between 20-40 pairs on Middle Island and 10-20 pairs on Stoltenhoff in

1972-74. Behaviourally, the birds on Middle Island are similar to those on Nightingale but those on Stoltenhoff are shy and skulking.

Breeding cycle

Breeding starts in September on all three islands. On 11 September 1973 on Middle Island six males had pink swollen testes 10-14,5 mm long. Two females were on the point of laying with ovaries 8-11 mm long. On 15 September on Stoltenhoff three males had swollen testes 9,5-11,5 mm long. Two females had just laid and had 10 mm long ovaries and dilated, convoluted oviducts. All the females, except one collected on Middle Island, had prominent brood patches. On 18 September a clutch of two, well incubated eggs was found. These measured 32x21 and 33x21 mm and were light green and speckled. The nest is built of coarse tussock.

Diet

The stomachs of nine birds from Middle Island contained beetles (Coleoptera), weevils (Curcilionidae), caterpillars (Lepidoptera), insect larvae and a few amphipods and isopods (Crustacea). Some also contained eggshell and one included a whelk shell. The most abundant food in the stomachs of five birds from Stoltenhoff was ticks (Ixodoidea). These birds also fed on beetles, weevils, caterpillars, snails and eggs.

Morphology

The fresh masses of nine Tristan Thrushes from Middle Island in September ranged from 78-96 g, (mean 85 g) and five birds from Stoltenhoff ranged from 86-124 g (mean 102 g). Whether the birds at Middle Island and Stoltenhoff may be regarded as racially distinct from those on Nightingale is as yet undetermined.

Residues of persistent chemicals (0,15 ppm DDE and 0,22 ppm PCB's) were found in an embryo I collected of the Tristan Thrush on Nightingale (Bourne & Bogan 1976).

In 1968 and 1973 islanders brought back from Nightingale to Tristan a few Tristan Thrusnes as pets. Most of the 12 brought back in 1973 soon escaped. They stayed in or near Edinburgh Settlement and, I think, soon died. Potentially, however they posed a serious risk to the Tristan da Cunha subspecies of the Tristan Thrush with which they could have interbred, usurped or perhaps infected with disease. Such interisland transfers should not be allowed.

Tristan Bunting *Nesospiza acunhae*

Local name: Canary

Population

On Nightingale this bunting is abundant, especially in the

tussock. I estimated there were 500 to 1 000 breeding pairs in 1972-74. On Middle Island there were between 40 and 80 pairs and 20 to 40 pairs on Stoltenhoff. Hagen (1952) thought there were thousands of individuals on Inaccessible.

Breeding cycle

The breeding season extends from November to early February. There were several very recently fledged young being fed on Inaccessible between 15-19 January 1974 and likewise on Nightingale on 25 November 1973 and between 2-8 February 1973.

Diet

The stomach contents of five birds from Middle Island and four birds from Stoltenhoff included remains of insects, beetles, moth larvae and tussock seeds.

Morphology

The buntings on Middle and Stoltenhoff were inseparable from those on Nightingale in respect of plumage, soft parts and behaviour.

Wilkins' Bunting *Nesospiza wilkinsi*

Local name: Big Canary

Population

I thought there were, as Elliott (1957) estimated, *c.* 30 pairs on Nightingale. He thought there were not more than that on Inaccessible. They were not seen on Middle Island or Stoltenhoff in 1972-74.

Diet

The stomachs of three specimens from Nightingale contained only *Phylica* and *Nertera* fruits.

Voice

The call is a liquid penetrating whistle of several tones and is often repeated when the birds are in a small party. It is easily distinguished from the twittering of the Tristan Bunting.

On Nightingale in 1974, the islanders cut down one of the 20 ha occupied by the island tree *Phylica*. This was in order to facilitate the clearing of New Zealand Flax. *Phylica* is probably critical to the survival of Wilkins' Bunting and the unwitting destruction of its habitat was a reflection on the lack of local awareness of the protection the species requires.

Gough Bunting *Rowettia goughensis*

Population

I did not find this bird particularly common. I observed it from the beaches to 300 m a.s.l., but it is, however, reported over the whole island. The breeding density at Long Beach and in the southeast quadrant was approximately four adult pairs per km , giving an estimated population of around 200 pairs for the whole island.

Breeding cycle

In the first half of October 1973 one of the metereologists found a nest, containing one chick and the remains of two eggshells, in a clump of sedge grass on the ground adjacent to the Metereological Station. It was a long open nest without a lining, and several tunnels led away from the entrance. I found what I thought to be an unoccupied nest at 300 m a.s.l. in long, soft grass. There was one approach tunnel 70-80 mm wide and 400 mm deep leading to an unlined cup.

Diet

The species appears omnivorous. It forages on the shoreline, presumably on amphipods and diptera; it takes flesh from dead birds and eats broken eggs. Unlike the Tristan Thrush, however, it apparently cannot break eggs. It was also seen to take grass seeds and small insects. It is not as approachable as the Tristan Thrush or Tristan and Wilkin's Buntings. The calls are a penetrating repeated "cheet"; a thin, indrawn whistle and a twittering, chattering sparrow-like trill which includes a harsh "zzzeet" note. It is harried by the Gough Moorhen.

4. NONBREEDING SPECIES

Seabirds

A single King Penguin *Aptenodytes patagonicus* was photographed in June 1961 at Gough (La Grange 1961). One Macaroni Penguin *Eudyptes chrysolophus* was collected by the Norwegians (Hagen 1952). The islanders are familiar with this species and report it from the other islands.

Hagen (1952) collected a Wandering Albatross of the nominate race 80 km west of Inaccessible and Tickell (1968) recorded that a ringed South Georgian bird was recovered on Gough. As they are indistinguishable in the field from the Tristan Wandering Albatross they are probably more common than the two records would suggest. I saw a Shy Albatross *Diomedea cauta* just off the Edinburgh Settlement in July 1974 flying with Blackbrowed Albatrosses *D. melanophris*. A Greyheaded Albatross *D.*

TABLE 11

POPULATION ESTIMATES OF BREEDING PAIRS* OF BIRDS AT TRISTAN DA CUNHA GROUP AND GOUGH ISLAND, 1972-74

	Tristan	Nightingale	Middle	Stoltenhoff	Inaccessible	Gough
Rockhopper Penguin	7 000	25 000	100 000	0	25 000	2×10^6
Wandering Albatross	extinct	0	0	0	2-3	2 000
Yellownosed Albatross	16 000-30 000	4 500	100 200	500	1 400	5 000-10 000
Sooty Albatross	2 000-3 000	100-200	0	25-50	2 000	5 000-10 000
Southern Giant Petrel	extinct	0	0	0	0	4-60
Greatwinged Petrel	1 000-3 000	0	0	0	unknown	10^5-10^6
Atlantic Petrel	100-200	0	0	0	unknown	10^5-10^6
Kerguelen Petrel	unknown	unknown	unknown	unknown	unknown	10^6-10^7
Softplumaged Petrel	100-500	100-1 000	unknown	unknown	100-1 000	10^6-10^7
Broadbilled Prion	1 000-10^4	10^4-10^5	unknown	unknown	10^4-10^5	10^6-10^7
Whitechinned Petrel	0	0	0	0	100	unknown
Grey Petrel	50-100	0	0	0	unknown	10^5-10^6
Little Shearwater	unknown	100-1 000	unknown	unknown	100-1 000	10^5-10^6
Great Shearwater	extinct	4×10^6	25 000-50 000	25 000-50 000	10^5-10^6	6×10^5-3×10^6
Greybacked Stormpetrel	0	0	0	0	0	1 000-10^4
Whitefaced Stormpetrel	0	1 000-10^4	unknown	unknown	1 000-10^4	1 000-10^4
Whitebellied Stormpetrel	0	100-1 000	unknown	unknown	100-1 000	1 000-10^4
Common Divingpetrel	0	10^4-10^5	unknown	unknown	1 000-10^4	10^5-10^6
Subantarctic Skua	5-10	100-500	1-10	1-5	50-200	2 000-3 000
Antarctic Tern	50-70	100-300	0	100	100-400	500-1 000
Common Noddy	30-50	200-500	0	100	100-500	100-500
Inaccessible Flightless Rail	0	0	0	0	1 000-2 000	0
Tristan/Gough Moorhen	170-255	0	0	0	0	300-500
Tristan Thrush	40-60	300-500	20-40	10-20	100-500	0
Tristan Bunting	extinct	500-1 000	40-80	20-40	500-1 000	0
Wilkins' Bunting	0	30	0	0	30	0
Gough Bunting	0	0	0	0	0	200

* see text for methods of estimation

TABLE 12

APPROXIMATE MEAN NUMBER AND RANGE OF BREEDING PAIRS OF SEABIRDS AND LANDBIRDS AND THEIR APPROXIMATE BREEDING DENSITY AT THE TRISTAN DA CUNHA GROUP AND GOUGH ISLAND

Island	Mean numbers of breeding pairs	Range	Breeding density (pairs/km)
		Seabirds	
Tristan	40 000	27 335 → 53 930	500
Nightingale	4 000 000	4 051 300 → 4 244 000	1 000 000
Middle	100 000	125 101 → 150 210	300 000
Stoltenhoff	40 000	25 726 → 50 755	200 000
Inaccessible	600 000	141 052 → 1 152 603	50 000
Gough	20 000 000	6 117 604 → 40 056 560	400 000
All islands	30 000 000	10 488 118 → 45 708 058	200 000
		Landbirds	
Tristan	300	210 → 315	3
Nightingale	1 000	830 → 1 530	300
Middle	100	80 → 120	200
Stoltenhoff	40	30 → 60	200
Inaccessible	3 000	1 630 → 3 530	200
Gough	600	500 → 700	10
All islands	5 000	3 280 → 6 255	30

chrysostoma was seen under poor conditions on 11 June 1974 off Tristan and another was seen when travelling between Tristan and Gough on 19 October 1974.

A single Lightmantled Sooty Albatross was observed midway between Tristan and Inaccessible on 15 January 1974. This albatross has also been seen at Gough, as Clarke (1905), Broekhuysen & Macnae (1949) and Swales (1965) record.

Swales (1965) questioned whether the Blackbrowed Albatross had occurred at Gough. I collected one adult and saw up to eight at any one time in Gough waters between 28 October - 4 November. Both mature and immature birds are regular visitors to the northerly islands where single birds can be observed daily between April and November. Occasional groups of 20-40 were seen when fishing boats were in the vicinity. They belong to the darkeyed race.

The Southern Giant Petrel is a perennial visitor to the group though more common in the winter, both colour phases being seen. Johnstone (1974) reported that this bird did not feed behind ships in Australian waters though I saw adults and immatures scavenging alongside the Northern Giant Petrel as our ship lay at anchor off Gough.

The Antarctic Fulmar *Fulmarus glacialoides* was seen occasionally by me off Tristan between April and October and once off Stoltenhoff in September. Two of a party of 12 were collected at Gough on 4 November 1972 and another at Tristan on 8 August 1973. They were easily caught on a handline. A few of the island fishermen know this bird, calling it a "Snow Gull".

The Pintado Petrel *Daption capense*, like some of the other winter visitors such as Blackbrowed Albatrosses, Antarctic Fulmars and Wilson's Stormpetrels *Oceanites oceanicus*, is more numerous on the arrival of visiting ships. I collected it at Gough and saw it on several occasions between April and November at Tristan and Nightingale.

The undated specimen of the Whitenecked Petrel *Pterodroma externa* is retained in the check list although its occurrence seems unlikely. It was presented to the Royal Scottish Museum in 1924 from a collection by J.G. Gordon who received several bird specimens from two islanders, Tom Rogers and Robert Glass in 1919 and 1923. All the other specimens were perfectly feasible though with little data and in poor condition. It is difficult to see how the islanders came by the specimen other than by legitimate means and from within the islands themselves; as Bourne (1967) states, the *Pterodroma* spp. are capable of great feats of wandering and a stray that entered the Atlantic could have reached Tristan.

A Cory's Shearwater *Calonectris diomedea* grounded at Gough in February 1973, was identified in the hand by the meteorologists and then released. I had good views of six Sooty Shearwaters *Puffinus griseus* as they trailed our ship from Tristan to within 80 km of Gough on 29 October 1974. Wilson's Stormpetrel is a frequent winter visitor to the group.

Immature Kelp Gulls *Larus dominicanus* were recorded at Gough and the northerly islands from May to September by Verrill (1895),

Wilkins (1922), Elliott (1957) and Swales (1965). J. Flint (pers. comm.) saw between one to seven juveniles at Tristan from 18 June-29 September 1964 and one at Nightingale on 19 September 1965. G. Edwards (pers. comm.) saw one juvenile at Nightingale on 6 February 1967. I shot an immature bird at Tristan on 5 June 1974. An egg was listed by Lowe in Rogers (1926) as belonging to this species and deriving from the northerly islands. However, Kelp Gulls do not breed in the group and the egg was probably that of a Subantarctic Skua.

Franklin's Gull *Larus pipixcan* was first recorded in February 1956 on Tristan by Swales & Murphy (1965). I had good views of one on 26 May and 7 June 1973 at the Potato Patches, Tristan.

An Arctic Tern was collected by Elliott (1957) on Tristan on 20 October 1951. He commented, rightly, that the similar immature Antarctic Tern was unusual at that date. I found the two indistinguishable in the field. I shot an Arctic Tern on 12 December 1972 which I had thought was an Antarctic Tern and on 17 January 1974 I collected one of three immature Antarctic Terns on Inaccessible which I had been sure were Arctic Terns.

The Black or Lesser Noddy *Anous tenuirostris* (*A. minutus*) was formerly thought to have bred on Inaccessible. It is currently only regarded as a straggler to the group (Watson 1969, Beintema 1972).

Shorebirds and landbirds

Waders (Charadrii)

Most observers staying on Tristan have reported waders (Charadrii). Keytel collected a Sanderling *Calidris alba* (Winterbottom 1958) and Elliott (1957) recorded single South American Dotterels *Zonibyx modestus*, (16 May 1952), Spotted Sandpipers *Actitis macularia* (February 1952), Sharptailed Sandpipers *Calidris acuminata* (16 June 1950) and Upland Sandpipers *Bartramia longicauda* (19 October 1952). G. Edwards (pers. comm.) sighted a Pectoral Sandpiper *Calidris melanotos* on the Settlement plain, Tristan on 4 December 1966. It had "a rather short bill and, in flight, had a dark centre to the tail". He had sight records of a single Whiterumped Sandpiper *C. fuscicollis* between 23 October-13 December 1966.

In 1972-1974, waders were recorded in almost every month. I captured a Solitary Sandpiper from an Edinburgh Settlement hen run on 12 October 1973. Between 23 October 1973 and 28 January 1974, small flocks of Whiterumped Sandpipers frequented the Settlement Beaches and another small flock appeared on 15 October 1974. Five specimens were collected. Sight records of five Turnstones *Arenaria interpres* were made on the Settlement plain and beaches between 13 July-21 September 1974. This species was also accurately described to me by islanders from sightings made on 10-11 September at Nightingale.

Herons

The five heron species characteristically arrive at the group

from the end of February until May. The majority of records (Table 13) are for April.

The sightings of all the strays to the islands are a function of the number of outside observers and do not necessarily reflect either the frequency or timing of the arrival of strays. Five egrets were reported as being present on the main island on 8 September 1962 (J. Flint pers. comm.). I saw two egrets on 8 September 1974 which were the last survivors of a party of eight which were first seen by me at the Settlement on 7 April 1974. Even then islanders reported two egrets on the south side of the island a week earlier and again on 20 September 1974. It is not always possible validly to link their appearance on Tristan with particular meteorological conditions off South America.

Those examined on arrival were emaciated with no subcutaneous fat and only around 50 % - 80 % of their expected body masses (Table 14). The Great White Egret *Egretta alba* fed at the Settlement fresh water streams. The Snowy Egrets *E. thula* fed there and at the Settlement reservoir as well as in the shallow seawater pools and among rotting kelp on the beaches below the Settlement. In contrast, the Cattle Egrets *Bubulcus ibis* fed on isopods on the Settlement plain.

Ducks

On 8 May 1968 on Gough, there was a poor sighting of a grey duck with a dark bill (C.C.H. Elliott, pers. comm.). It was listed as a Chilean Teal *Anas flavirostris* by Holdgate & Wace (1976). A Chilean Teal was recorded on Tristan on 25 October 1974.

Rails

A Paintbilled Crake *Neocrex erythrops*, captured on 13 July, was seen at Edinburgh Settlement throughout June 1974.

Gallinules

Keytel, who collected birds on Tristan in 1908-1909, presented an "Island Hen" to the South African Museum. However, the Tristan Moorhen was presumed extinct on Tristan da Cunha at this time and Keytel did not visit Gough Island. The bird was later identified as a juvenile Moorhen *Gallinula chloropus*. Beintema (1972) thought the record interesting but unreliable. It could, however, have been a vagrant from South America and I see no reason to discredit it. It is not known that any of Keytel's specimens were collected away from the islands and his other vagrants, an American Purple Gallinule *Porphyrula martinica*, a Redgartered Coot *Fulica armillata* and a Sanderling, are not likely to be deliberate frauds.

American Purple Gallinules known as "Gutter Snakes" by the islanders, are now common annual strays to the northerly islands. It does not appear, however, that this was always the case. Keytel collected one in 1908-1909 (C.C.H. Elliott pers. comm.). In 1919, a single specimen was received by J.G. Gordon and Mathews & Gordon (1932) recorded the note by the islanders who sent it: "it is the only one we ever saw on the island".

TABLE 13

RECORDS OF STRAY HERONS AT THE TRISTAN DA CUNHA GROUP AND GOUGH ISLAND

Species	No. of birds	Date	Type of record	Locality	Source
Whitenecked Heron	1	6 May 1968	specimen	G	C.C.H. Elliott (pers. comm.)
Great White Egret	1	Apr 1950	sight	N	Elliott (1953)
	1	Apr 1952	sight	I	Elliott (1953)
	1	May 1968	sight	G	C.C.H. Elliott (pers. comm.)
	1	Apr-May 1972	sight	T	G. Jack (pers. comm.)
	1	7 Apr 1974	specimen	T	this paper
Snowy Egret	1	4 May 1950	specimen	T	Elliott (1957)
	1	5 May 1952	specimen	T	Elliott (1953)
	5	8 Sept 1962	sight	T)	
	2	21 Mar - 2 Apr 1964	sight	T)	J. Flint (pers. comm.)
	1	9 May 1964	sight	T)	
	1	8 Apr - 6 May 1967	sight	T	G. Edwards (pers. comm.)
	1	21 May 1968	sight	T)	C.C.H. Elliott
	2	29 Feb 1968	sight	I)	(pers. comm.)
	1	22 Apr - 2 May 1974	photograph	G	Meteorologists (pers. comm.)
	1	4 Apr 1974	sight	T	this paper
	8	7 April - 8 Sept 1974	specimens (2)	T	this paper
Striated Heron	1	25 Apr 1974	specimen	T	this paper
Cattle Egret	1	May 1968	photograph	G	N. Wace (pers. comm.)
	4	19 Mar 1973	specimens (2)	T	this paper
	1	22 Apr - 2 May 1974	photograph	G	Meteorologists (pers. comm.)
	3	Apr - May 1975	photograph	G	V.Trollip (pers. comm.)

TABLE 14

MASSES OF STRAY HERONS AND GALLINULES AT TRISTAN DA CUNHA COMPARED WITH MEAN MASSES OF THE SPECIES

Species	Date	Sex	Mass (g)	Mass (g) of mainland bird and reference	Mass as an approx. percentage of that of mainland birds
Great White Egret	7 Apr 1974	F	740	Austin (in Palmer 1962) records a female in Florida in April weighing 917 g	80
Snowy Egret	7 Apr 1974	F	175	Palmer (1962) records masses up to 370 g	50
	7 Apr 1974	F	250		70
Cattle Egret	19 Mar 1973	M	230	Paulson (in Palmer 1962) gives 4 unsexed birds between 300-400 g	65
American Purple Gallinule	6 Apr 1973	F	130	ffrench (1976) gives the mean mass of three females in Trinidad and Tobago as 190 g	70
	8 Apr 1973	?	124		
	8 Apr 1973	?	132		
	16 Apr 1973	M	136		
	17 Apr 1973	F	124		
	7 May 1973	F	118		
	10 May 1973	F	166		
	4 Jun 1973	F	114		
			(mean 130)		

Between 1909 and 1968, there have been specimens and reports of 35 birds (Roberts 1948, Hagen 1952, Ripley 1954, Rand 1955, Elliott 1957, and personal communications from C.C.H. Elliott, G. Edwards, J. Flint, M.W. Holdgate, M.K. Rowan and N.M. Wace). All these birds were recorded between March and August, excepting one in October and one in November.

I collected eight specimens, kept eight birds in captivity and recorded at least 31 others between 6 April-18 June 1973. Between 16 April - 1 September 1974, I saw between 10 and 20. It was difficult to be sure of the numbers as some were seen more than once. The September record was of a bird that had survived for several months among New Zealand Flax in the Settlement. I suspect this was the case with the previous October and November records. During my stay, islanders reported individual sightings of American Purple Gallinules on Nightingale in April and May and from near Inaccessible in April when a bird landed on an offshore fishing vessel. It thus seems likely that this species, like the Cattle Egret, has become increasingly frequent during this century.

Of the 35 birds in the literature, only three were adults and three were moulting into adult plumage. Of the 40-50 birds I saw, only one was in adult plumage on arrival in April. By August, however, several birds had moulted into adult plumage.

On first landing, most were exhausted and emaciated, weighing between 60 % - 90 % of their normal body mass (Table 14). Some died soon after arrival and cats took a heavy toll of the weak birds. I kept eight captive in an outside aviary of which five were still alive fifteen months later. One pair successfully hatched five eggs in December 1974 and then killed the other three adults (D. Ruddiman pers. comm.). I have since heard that the breeding pair and their brood were liberated in the Edinburgh Settlement, but do not know their subsequent fate. Such "introductions" are not desirable.

Passerines

An adult American Barn Swallow *Hirundo rustica erythrogaster* was collected by Hagen (1952) on 22 March 1938. Elliott (1957) recorded the species on 30 October 1952 and J. Flint (pers. comm.) saw three on 4 October 1965 around the Settlement. G. Edwards (pers. comm.) saw two juveniles, eight immatures and one near adult bird near the Settlement between 30 October - 3 November 1966. Islanders reported to C.C.H. Elliott (pers. comm.) that there were two swallows around Edinburgh Settlement in April 1968.

Unconfirmed and unidentified vagrants

In addition to the above records of vagrants, the following unconfirmed and unidentified vagrants have been recorded within the islands. These mainly comprise records of birds seen by non-ornithologists, predominantly islanders, where the views obtained did not allow specific identification or specimens whose origin is questionable.

Magellanic Penguin *Spheniscus magellanicus*. The islanders

occasionally report penguins on Tristan beaches whose description fits this species (Elliott 1957).

Blackbrowed Albatross *Diomedea melanophris*. A "Cape Molly and a real Molly" were reputed to have bred successfully at Stony Beach, Tristan in the 1930's.

Frigatebird *Fregata* sp. Elliott (1957) saw a frigatebird, possibly the Greater Frigatebird *F. minor*, off Inaccessible on 6 March 1951 and off Tristan on 18 December in the same year.

Gannet/booby *Sula* sp. A probable adult Cape Gannet *S. capensis* was seen by islanders in August 1969 and I saw an immature gannet or booby on 23 August and 6 September 1974.

Tern *Sterna* sp. A large, speckled ternlike bird was seen near the Settlement on 14-20 May, 1952 (Elliott 1957).

Godwit *Limosa* sp. One was seen on the Settlement beach on 28 December, 1963. It may have been a Hudsonian Godwit *L. haemostica* (J Flint pers. comm.).

Wader *Tringa* sp. I saw a wader at Pig Bite pond and on the ponds west of the new lava flow on Tristan between 6-12 April, 1974. The individual had a trisyllabic call on being flushed and looked like a Greenshank *T. nebularia*.

Snipe *Gallinago* sp. A single snipelike bird was seen by me at Hottentot Point in December, 1972 and again at Sandy Point by islanders between 6-7 September, 1974. The bird was brown above and white below.

Egrets A party of five on 8 September, 1962; two at the beginning of April and on 20 September 1974, all on Tristan.

Heron *Ardea* sp. A large heron which may have been a Whitenecked Heron *A. cocoi* (which has been recorded on Gough) or a Great Blue Heron *A. herodias*, was reported from Tristan on 11 May 1975. On 2 April 1975 on Tristan a small heron was seen by an islander which resembled a Blackcrowned Night Heron *Nycticorax nycticorax*.

Ducks *Anas* sp. A flight of duck, the size of teal, was reported in the 1940's near the Settlement.

Teal *Anas* sp. I saw a party of five teal-like ducks at the Settlement freshwater ponds between 23 October and 2 November 1974.

Rail *Rallus* sp. A small rail was frequently seen by islanders in Settlement gardens in November 1972.

Moorhen *Gallinula* sp. A bird fitting the description of a Common Moorhen *G. chloropus* was seen by islanders in the Settlement throughout July 1974.

Pigeons *Columba* sp. A flock of pigeons was apparently seen near the Potato Patches, Tristan *c.* 1940. This was before Carrier Pigeons *C. livia* were introduced as an experiment in relaying messages from the outlying islands. These latter birds soon died out.

Passerines. A thrush-like bird (*Turdus* sp.) was present at Sandy Point between 26-30 March and in the Settlement from 9-15 April, 1973. I did not manage to see it. In February or March 1964 two small dark green birds, one with a red breast, but otherwise similar to Tristan Buntings, were seen on Nightingale by islanders.

There were two pet Budgerigars *Melopsittacus undulatus* in islanders' homes in 1974. Apart from poultry, they were the only introduced species of bird present. They were imported without regard to the potential hazard of introducing psittacosis to the islanders or to the wild birds.

5. ORIGINS OF VAGRANT SHOREBIRDS AND LANDBIRDS

I support Rand (1955) and Elliott (1957) in hypothesizing a Neotropical rather than an Ethiopian origin for the landbirds and shorebirds of the islands. I base this on the direction of the prevailing winds, the similarities between the endemic forms and South American ones, and the American origins of the present day strays. The islands do not lie on any migratory landbird route and hence all landbirds at the group must be windblown vagrants.

The Tristan group and Gough Island lie in a westerly wind belt, thus facilitating possible arrivals from the west and hindering those from the east. Although the nearest point to Tristan on the African coast is 400 km closer than the nearest point on South America, it is almost inconceivable that the small landbirds of the islands could have flown 2 800 km against the "Roaring Forties".

There are obvious similarities between some Tristan landbirds and existing South American species. The Flightless Moorhens are undoubtedly derived from the American race of the cosmopolitan Moorhen which they closely resemble. Indeed the Moorhen has strayed at least once to Tristan (see above). Rand (1955) showed that the island buntings of the genera *Nesospiza* and *Rowettia* resemble South American emberizines. The Gough Bunting is very similar to the Falkland Blackthroated Finch *Melanodera melanodera*. Elliott (1957) thought that *Nesospiza* and *Rowettia* were not clearly related, though he does not question their origin from a South American emberizine. Lowe (1928) and W.R.P. Bourne (pers. comm.) thought the Inaccessible Flightless Rail was akin to the South American Dotwinged Crake *Porzana spiloptera*, although Rand (1955) considered it impossible to suggest the original stock because of the gross modifications to the skeleton and feathers. Olson (1973) proposed that an ancient group of now extinct rails, *"pro-Rallus"* existed, either in the New World or Africa, and he conjectured that the extinct and extant rails of the Atlantic Islands derived from this relict. However, the similarities in the rails at different island localities could be more simply explained by convergent evolution. The Tristan Thrush was considered an offshoot of *Turdus* by Rand (1955). Hall & Moreau (1970) suggested that the Tristan Thrush may have possibly derived from a common ancestor of the African Groundscaper

Thrush *Turdus litsitsirupa* and the European Song Thrush *T. philomelas*. Yet none of the similarities of colour, build or pattern are peculiar to African thrushes and they conclude a South American ancestor is more probable and in keeping with the origin of the other landbirds. Elliott (1957) noted the similarity with the immature Falkland Thrush *T. falklandii*.

Further supporting evidence for the hypothesis of a Neotropical origin for the endemic land forms is seen in the ever increasing catalogue of confirmed land and shorebirds that derive from the Americas. All 11 confirmed species of landbird strays at Tristan breed in, or migrate to, South America. No confirmed vagrant landbird has affinities with Africa except the Cattle Egret which also occurs in South America. The nine confirmed waders of the group also either breed in or migrate to South America, although some species do occur in Africa.

The Falkland Islands lie 560 km from South America and, like the Tristan group, are downwind of that continent. The landbirds of the Falkland Islands quite obviously derive from the Neotropics. If it were the case that the endemic landbirds of both sets of islands derived from South America then it would be anticipated that the Falklands and the Tristan da Cunha islands would have landbirds in common. Woods (1957) gives a check list for the Falklands. Eight of the 11 confirmed land vagrants and four of the nine confirmed waders of Tristan also occur on the Falklands.

Because the Falklands are in much higher latitudes (51 -53S) they will not necessarily receive all the vagrant species that have been recorded at Tristan, and the reverse may also apply.

In conclusion, there is little evidence to refute the present conjecture that the Tristan landbirds have a Neotropical origin, and little to support an African origin.

6. EXPLOITATION OF BIRDS BY THE TRISTAN ISLANDERS

Last century, the bulk of the bird harvest came from the main island of Tristan. Wandering, Yellownosed and Sooty Albatrosses, Rockhopper Penguins, Greatwinged, Atlantic, Softplumaged and Grey Petrels, Broadbilled Prions, Tristan Flightless Moorhens and even the Tristan Thrush were exploited for their eggs, flesh, fat, skins, or feathers until they were killed out or populations were so depleted that they were no longer economically viable to crop.

By the turn of the century, the islanders were compelled to look farther afield for their seabird harvest and so they sailed to Inaccessible and Nightingale Islands in thirty-foot canvas longboats. The former island was difficult to land on and probably fell out of favour when an easier landing place at Nightingale was discovered in the 1920's. Since then Nightingale has been the main hunting ground and the Great Shearwater has become the most important source of fat and flesh. This has allowed the populations of penguins, albatrosses and petrels to recover on the main island. Only the Rockhopper Penguin and Yellownosed Albatross on Nightingale have apparently suffered from the change.

There are no complete and reliable published figures of the seabird harvest. The previous estimates of Barrow (1910), Rogers (1926), Mathews & Gordon (1932), Munch (1945), Roberts (1948), Rowan (1951), Hagen (1952), Flint (1957) and Wace & Holdgate (1976) give only a patchy account of hunting activities. These authors have had to rely on the islanders' modest estimates or have only been able to present limited data. They refer to only one species, one island or part of a season with the result that the pattern and extent of previous hunting activities are difficult to assess. This in turn, I suspect, has led to a persistent underestimate of the harvest and its economic importance.

The following details are given of the historical and contemporary aspects of the harvest as it affects individual exploited species.

Rockhopper Penguin

On Tristan at the turn of the century there were, according to the older islanders, 15 penguin colonies. By the 1920's those at Rookery Point, East Jew's Point, Halfway Beach, Sandy Point, Stony Beach Gulch, Bull Point, East and West Stony Gulch and Anchorstock no longer existed. The adult birds were killed for their plumes to be used as ornaments, "tossel mats", and for decoration on purses, handbags and sheepskin mats. Adults and moulting juveniles were boiled down for their oil which was used for lamps, for diluting paint and for treating canvas. Birds were occasionally used for fish bait and sometimes their skins were used as fire lighters. The hindquarters of chicks were used as food when none other was available. The crude methods of collecting feathers from moulting birds for mattresses may have displaced some birds from the island. They were plucked by hand or enclosed in a confined pen where fights and friction effected a greatly accelerated moult. Egging on the main island was probably excessive: 25 200 were cropped in 1924 (Rogers 1926) compared with 1 476 and 3 000 in 1973 and 1974 respectively. Since the 1940's the bulk of the penguin egg harvest has been from Nightingale. The collecting of penguin feathers died out in the 1950's and since then juveniles and adults have not been killed for their plumes or fat. It is these changes that have allowed a slow recovery of the numbers of penguins on Tristan. There are now (early 1970's) an estimated 7 000 breeding pairs compared with an estimated 5 000 pairs in 1951 (Elliott, 1957) which may reflect a genuine increase. At present all the colonies on Tristan are extending their geographical boundaries, e.g. at Big Gulch the colony extends to 100 m a.s.l. and 0,5 km from the shore.

Previous figures are not available, but the islanders reported to me that guano collecting, for use on the Potato Patches, started in the 1930's, was at its peak shortly after when there were up to 11 'guano trips' per year to Nightingale, and since the 1950's it has decreased. This is probably due to the availability of chemical fertilizers and fish meal and the islanders recognizing their superiority over the poor quality guano. In any case, extracting guano does not appear to interfere with the colonies.

I suspect that Rockhopper Penguins at Nightingale have been overexploited and their numbers are decreasing as a result. In 1973 and 1974 between 23 400 and 37 100 eggs were taken from Nightingale, although these figures include a small number taken from Middle Island. Elliott (1957) thought there were as many as 250 000 pairs at Nightingale and I estimated there were but half of that figure on the two islands in 1972–74. This probably reflects inaccurate estimates rather than the results of excessive harvesting. The increased number of penguin eggs taken in 1972-74 results from the halting of collecting Great Shearwater eggs at that time.

The islanders usually collect all available eggs early in the season. There is considerable wastage of the harvested eggs with as much as one third lost due to breakages and putrefaction.

Yellownosed Albatross

On the main island the Yellownosed Albatross was the single most important source of young birds and fat during the summer, from the founding of the Settlement in 1816 until the 1920's. By the 1930's, their numbers had been so drastically reduced that the islanders had to look to Nightingale for further supplies. Between 1928 and 1950 (Table 16) there were modest estimates of 3 000–10 000 eggs and *c.* 2 500 chicks being taken each year from Nightingale (Roberts 1948, Hagen 1952). The pattern of overexploitation repeated itself and the population collapsed. Rowan (1951) suggested that the Nightingale population in 1949 could tolerate in excess of 5 500 birds being cropped annually. There are not even that many pairs left now and the islanders have had to impose severe restrictions on the harvest so that few eggs and chicks are now taken. Eggs are no longer taken on the main island and the number of chicks killed is dictated by the Chief Islander. In 1972–74 the taking of Great Shearwater chicks offset the decreased albatross chick harvest at Nightingale.

Atlantic and Greatwinged Petrels

On Tristan, until recently, the Atlantic and Greatwinged Petrels were of major economic importance to the islanders because they nested in winter months when fishing was often difficult and the livestock unfit to eat. The adults and eggs were collected, the chicks "tried out" for cooking fat, and the flesh stored in brine. Some of the older islanders told me that in the 1920's a single man could collect 1 000 birds in a week for his family. At that time there were 30 families on the island. By the 1940's petrels were scarce and in 1950–52 Elliott (1957) felt they were in urgent need of protection and he instituted conservation measures.

The eggs are no longer taken. In 1950 and 1951, 50 and 125 "haglet" chicks were collected under licence and in 1973 approximately 200 birds were harvested. They are traditionally taken in the last two weeks of October using dogs to sniff out

the inhabited burrows and where necessary, drag the birds out. The young may be extracted from longer burrows by employing a stick with a frayed tip which entangles the downy breast so that the bird can be pulled out. In 1972-74 the harvesting was done on one particular day on the recommendation of the Chief Islander. Unfortunately, the Administration kept no account of the numbers taken in 1972-74 and no licensing method then existed.

Broadbilled Prion

Broadbilled Prions were regularly exploited for their eggs on Tristan and for their young on Nightingale from at least the turn of the century until the 1950's. Prelaying birds were caught at "nightbird fires". These beach fires were lit on moonless, windless nights around 20 August and birds drawn to the fire were grounded or caught in the air. Gravid birds were slit open or boxed overnight and released after laying. Nesting caves and burrows were also robbed of eggs. However in 1969 an islander died while searching for eggs and the practise has now stopped. In addition, chicks are no longer taken on Nightingale where it was customary to eat them during the "petrel egg trips" during 10-13 November.

Great Shearwater

The Great Shearwater was of no economic importance to the islanders for the first 100 years of Tristan's history. Regular trips to Nightingale and Inaccessible began just after the turn of the century and by the 1930's the species was being massively, but probably safely, exploited on Nightingale. The rewards of the "petrel egg trip" offset the decreasing yields from the reduced Yellownosed Albatross and Rockhopper Penguin populations of the main island. Great Shearwater eggs were taken regularly until the advent of commercial fishing in 1950, since when there have only been occasional trips and none recently (1970's). A fat yield of several thousand litres annually from the 1930's to the 1960's resulted in fewer Yellownosed and Sooty Albatross and Greatwinged Petrel chicks being taken. The demand for seabird oil has decreased since the 1960's and some families now use only imported cooking oils. The annual crop of 10 000-20 000 chicks between the 1930's and the 1950's (Hagen 1952, Rowan 1952) was greatly exceeded in the 1970's because of the demands of an increasing population of islanders and because of the lack of other birds that can be so easily exploited. The culling of large numbers of adult Great Shearwaters is a recent phenomenon and is a result of facilities existing for preserving them in the factory refrigerators. The annual toll of *c.* 40 000-70 000 Great Shearwaters poses no immediate serious threat to their overall numbers at Nightingale Island.

Harvests from the outer islands during 1972-74

I went with the islanders on a number of their hunting trips to

the outer islands and on the main island and kept accurate figures of the amounts taken. Given the nature and dates of each trip, as well as the number of boats, as recorded in Table 15, the total harvest can be easily and fairly accurately assessed.

From January to March 1973, there were three "guano trips" to Nightingale involving 20 boats, with an average crew of 6,5 men each making a total of 130 hunters plus others who travelled as passengers. Each hunter collected 50-70 (average 60) chicks and 10 adult Great Shearwaters and five sacks of guano. Depending on the time of year and the humidity, guano sacks weighed 25-80 lbs, averaging approximately 27 kg. Each hunter thus collected about 135 kg. In 1974 there were six "guano trips", involving 28 boats and 182 hunters, and similar amounts were taken.

In March and early May 1973, 130 hunters (20 boats) took an agreed quota of 10 Yellownosed Albatross chicks each. In May 1973 a few individuals also took Sooty Albatross chicks, 25 in total. In March 1974, 15 boats made the trip. Each hunter was allowed two Yellownosed Albatross chicks to eat while at Nightingale but a further 200 were estimated to have been taken illegally.

In September 1973, four boats went on the "pinnamin egg trip". The 26 hunters each took approximately four Yellownosed Albatross eggs and two adult birds for eating while on the island. Each hunter collected three boxes containing 200-400 penguin eggs each. The average box contained 300 eggs. About 200 adult Great Shearwaters were also collected by each hunter. In September 1974, 39 hunters each took two Yellownosed Albatross adults and four eggs and 900 Rockhopper Penguin eggs. Five expatriates collected a further 1 000 eggs amongst them. Only a small number of adult Great Shearwaters were taken since they had not yet returned to the island in any number. However, on 15 September 1974 a motor boat collected 1 000 adult Great Shearwaters and 1 000 penguin eggs.

Harvests from Tristan da Cunha during 1972-74

On 8 September 1973, seven hunters collected 76 penguin eggs on the main island and seven hunters on 17 September 1973 each took about 200 eggs (the normal carrying load). Between 6-12 September 1974, ten hunters walking over the mountain collected loads of 200 eggs and four others collected 250 eggs each on a motor boat trip.

Although it was illegal to take Yellownosed Albatross chicks in 1973 on Tristan, 100-400 were taken in March and April of that year. About 50 adult birds were killed by people while they were holidaying around the beaches in September 1973. No eggs were taken. In 1974, there was no prohibition on collecting Yellownosed Albatross chicks on the main island and, as a consequence, between 9-13 April 45 hunters collected 30 birds each. About 50 adult birds were killed in September 1974 but eggs were not taken.

No Sooty Albatross eggs were taken in 1973 and 1974 on Tristan.

TABLE 15

LONGBOAT EXCURSIONS ON NIGHTINGALE, MIDDLE AND INACCESSIBLE ISLAND IN 1973 AND 1974

Nature of trip *	Number of boats	Departure date	Return date
		1973	
Guano	8	2 Feb	8 Feb
Guano	8	14 Mar	16 Mar (4 boats)
Guano	4	17 Mar	20 Mar (8 boats)
Fat	8	2 Apr	6 Apr
Fat and flax	3	30 Apr	10 May
Penguin eggs	4	14 Sep	20 Sep
		1974	
Guano	3	11 Jan	14 Jan
Guano (Inaccessible Is.)	2	15 Jan	20 Jan
Guano	8	4 Feb	6 Feb
Guano	2	4 Mar	7 Mar
Guano	6	5 Mar	7 Mar
Guano	7	16 Mar	22 Mar
Fat	8	2 May	10 May
Penguin eggs	6	10 Sep	12 Sep

* To Nightingale and Middle Islands with one exception

On 13 and 14 May 1973, 10 hunters each collected 30 Sooty Albatross chicks. About 5-10 adult birds were thought to have been killed by people on the beaches in September 1973. Between 14-19 May 1974, seven loads of chicks were taken and 5-10 adult birds were killed in September 1974.

On 28 October 1973, 10 hunters collected haglet chicks, mainly of the Greatwinged Petrel, but a few Atlantic Petrels were also taken. They took between 5-50 chicks each, averaging around 20. I left Tristan before the October 1974 hunt took place.

The harvest totals are drawn together in Table 16 which lists the data of 1973-74 together with H.F.I. Elliott's unpublished data of 1950-51.

Effects of harvesting

In contrast to Wace & Holdgate's (1976) claim that seabirds have decreased in importance to the islanders, it is evident (Table 16) that the exploitation in 1972-74 was greater than that in previous years. This is despite a marked increase in the living standards of the islanders since 1949 and their change from a subsistence to a cash economy. Paradoxically, the seabird populations concerned have also apparently increased.

The two main reasons for the increase in harvesting are the increased numbers of islanders and the ease with which the harvest can now be secured. In 1925, 1950 and 1974, there were 125, 240 and 299 islanders respectively. The move to Nightingale has provided an abundance of Great Shearwaters, Yellownosed Albatrosses and Rockhopper Penguins which are readily accessible and do not require that heavy loads be carried across difficult terrain, as was the case on Tristan.

The value and mass of the seabird harvest, excluding the guano, was *c.* U.K. Pounds 10 000 and 20 t in 1973 (Table 17). The cost of buying the equivalent protein and fat to each of the 90 families in 1973 would have been *c.* Pounds 100, at a time when a family income was *c.* Pounds 400. The value of the seabird harvest is thus considerable.

If the quota system of taking Yellownosed Albatrosses on Nightingale is maintained and if care is taken in monitoring the numbers of Rockhopper Penguins on Nightingale, then there is little to be concerned about in the present pattern of harvesting. Unfortunately, the history of fowling in the group is essentially one of insidious overexploitation leading to the decrease or extinction of local populations. Recovery lags behind the demands of an expanding human population which has risen 400 % this century. The effects of overexploitation are very apparent on the main island. The least accessible southwestern quadrant supports an estimated 50 times as many breeding birds as the northwestern quadrant where the islanders live (Table 2).

Sensible management of the seabird harvest must involve careful monitoring of the quantities as well as regular population monitoring of affected species. This was not done during 1972-74. Despite this the islanders, perhaps because of previous

TABLE 16

HARVEST TOTALS FOR TRISTAN, NIGHTINGALE AND MIDDLE ISLANDS FOR 1950-51 AND 1973-74

Species		1950 *	1951 *	1973	1974
Rockhopper Penguin	eggs	12 500	12 600	24 876	41 100
	adults	50	100	0	0
	guano (kg)	?	?	17 550	24 570
Yellownosed Albatross	eggs	2 000	2 400	100	156
	chicks	1 200	1 700	1 400-1 700	1 745
	adults	200	200	100	128
Sooty Albatross	chicks	150	100	325	210
	adults	0	0	5-10	5-10
Great Shearwater	eggs	15 000	0	0	0
	chicks	13 000	15 300	42 800-63 800	36 920-52 520
	adults	1 100	800	6 500	2 820
	fat	3 000 **	?	1 120	832
Greatwinged Petrel	chicks	50	125	200	-

* H.F.I. Elliott (*in litt.*)
** Rowan (1952)

TABLE 17

THE VALUE AND MASS OF THE 1973 SEABIRD HARVEST

	Quantity	Approximate individual mass (g)	Individual value ** (p)	Total mass (t)	Total value (UK pounds)
Rockhopper Penguin	*c.* 25 000 eggs	100	5	2,5	1 250
	17 550 guano		?	17,5	*
Yellownosed Albatross	100 eggs	212	10	-	10
	1 550 chick carcasses	1 000	50	1,5	775
Sooty Albatross	325 chick carcasses	1 500	75	0,5	244
Great Shearwater	*c.* 53 000 chick carcasses	200	10	10,6	5 300
	6 500 adult carcasses	600	30	3,9	1 950
	1 120 l oil		10	1,1	112
Greatwinged & Atlantic Petrels	200 chick carcasses	300	15	0,1	30
Totals				37,7	9 671

* Egg masses are means derived from weighings of 100 Rockhopper Penguin eggs and 22 Yellownosed Albatross eggs. Bird masses varied considerably and I have estimated mean masses for carcasses after skinning and gutting.

** Valuations based on 1973 costs on Tristan: chicken or mince 60p per kg; hen's eggs 40p per doz; vegetable oil *c.* 100p per litre. I costed seabird flesh at 50p per kg, eggs at 50p per kg and unrefined oil at 10p per litre.

mistakes or because of their relative affluence, are pursuing a more enlightened policy towards this important natural resource.

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APPENDIX ON MAMMALS

1. NATIVE MAMMALS

The Subantarctic Fur Seal *Arctocephalus tropicalis* exceeds 20 000 individuals at Gough (P.G. Shaughnessy pers. comm.), it also breeds on Nightingale and Inaccessible. At Tristan breeding was noted in 1972 when I found a dead pup amongst 60 adults at Cave Point. One live pup was found in 1973.

Individual Southern Sea Elephants *Mirounga leonina* haul out regularly on Tristan beaches but do not breed on the main island or Nightingale, nor did I find any breeding at Salt Beach, Inaccessible, in January 1974. There were between 200 and 300 individuals in 1955-56 at Gough (Wace & Holdgate 1976).

The Southern Right Whales *Eubalaena glacialis* were hunted in Tristan waters by Russians in 1963. Their numbers are now very low, although the few that there are produce frequent sightings as they circumnavigate the islands between September and November. During the period 1972-74 I thought there were no more than between three to six groups of mother and calf during any one month in the group. Previously they had been sufficiently abundant to be a nuisance to local fishermen.

2. INTRODUCED MAMMALS

The greatest present threat from introduced species to the birds of the group comes from the Black Rat *Rattus rattus*. Originating on the main island from a shipwreck in 1882, they must have reached plague proportions very rapidly and at this time would have done very great damage to the flora and fauna. Miss E.J. Taylor of Ministry of Agriculture, Fisheries and Food, United Kingdom, visited Tristan in 1966 and made a conservative estimate of 20 rats per acre or a total of *c.* 400 000 individuals (K.D. Taylor pers. comm). Rats are responsible for a high mortality amongst the chicks of Greatwinged, Atlantic, and Softplumaged Petrels and Broadbilled Prions. The eggs of the Tristan Thrush are apparently taken, as are those of Rockhopper Penguins. The impoverished numbers or absence on Tristan of Little Shearwaters, Kerguelen Petrels, stormpetrels and divingpetrels are probably due to the presence of rats. Rats are contained in the settlement area by regular poisoning. One day a year is set aside as "Ratting Day" when teams of men and dogs hunt them. Cats and Subantarctic Skuas also take a few rats.

Rats could so easily be introduced to the outer islands that it seems just a matter of time before they are. One was killed in an islander's longboat en route to Nightingale (Wace & Holdgate 1976), and one of the vessels of Tristan Investments (Pty) Ltd., which was fishing around the islands, was infested with rats in 1973. A dead rat was found in a crate shipped to Gough in 1968 (Wace & Holdgate 1976) and the supply ship M.V. *R.S.A.* brought another dead one to Gough Island in 1974.

The House Mouse *Mus musculus* of Tristan and Gough does not

appear to harm birds and is eaten by Subantarctic Skuas at Gough (Swales 1965). It is debatable if it has had any effect on the vegetation by eating roots and seeds.

Domestic and feral cats *Felis catus* have been present on Tristan throughout this century. Since the islanders considered that killing domestic cats brought bad luck they abandoned their unwanted pets on the mountain, thus continually replenishing the feral population. They prey on the Tristan Thrush, as well as the vagrant American Purple Gallinule and on other landbird vagrants. The islanders told me that cats kill chicks of Yellownosed Albatrosses and Greatwinged Petrels. In February 1974 cats were implicated in the spread of toxoplasmosis and I therefore shot all 54 in the village. Feral cats do not breed very successfully and I estimated there was a maximum of around 40 individuals. A bounty on tails secured the elimination of a few.

In 1974 there were approximately 70 dogs in the village. They are used in the hunting of birds, feral cats and rats. They are a menace if abandoned, which happens only rarely. Some islanders allow their dogs to run amok amongst the small breeding colony of fur seals on the south side of Tristan.

On Tristan on 4 April 1974 there were 447 cattle, 55 sheep, 48 donkeys, 10 pigs and 610 hens and ducks. The great majority were on the Settlement plain, with a few cattle at Sandy Point and Stony Beach. A few sheep graze on the Base plateau. All the feral goats on Tristan da Cunha were killed off in the mid 50's. There are no introduced mammals on any of the outer islands at present. Gough Island supports only the House Mouse.

EDITORIAL NOTE

The manuscript of this paper was completed in 1978 and published literature up to and including 1976 has been taken into account. No attempt has been made to update the manuscript subsequently. Readers should refer to Watkins & Cooper (1983) and Watkins *et al.* (1984) for the more recent literature on Tristan and Gough.

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